

Lumi United Technology Co., Ltd.

CE TEST REPORT

SCOPE OF WORK:

Article 3.2 of RE directive (2014/53/EU) – RF report

Model:

LEDS-K01, LEDS-K02, RLS-K01D, RLS-K02D

REPORT NUMBER

230401083SHA-001

ISSUE DATE

April 17, 2023

DOCUMENT CONTROL NUMBER

TTRF300328-02_V2

© 2018 Intertek



Applicant : Lumi United Technology Co., Ltd.
Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No.
3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential
District, Nanshan District, Shenzhen, China

Manufacturer : Same as applicant

Manufacturing site : Same as applicant

Summary

The equipment complies with the requirements according to the following standard(s) or Specification:

EN 300 328 V2.2.2: Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

PREPARED BY:

REVIEWED BY:

Project Engineer
Alexander Li

Reviewer
Wakeyou Wang

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Contents

| | |
|--|-----------|
| REVISION HISTORY | 5 |
| MEASUREMENT RESULT SUMMARY | 6 |
| 1 GENERAL INFORMATION | 7 |
| 1.1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) | 7 |
| 1.2 RF TECHNICAL INFORMATION | 8 |
| 1.3 DESCRIPTION OF TEST FACILITY | 10 |
| 2 TEST SPECIFICATIONS | 11 |
| 2.1 STANDARDS OR SPECIFICATION | 11 |
| 2.2 MODE OF OPERATION DURING THE TEST | 11 |
| 2.3 TEST PERIPHERALS USED | 11 |
| 2.4 RECORD OF NORMAL AND EXTREME TEST CONDITIONS | 12 |
| 2.5 INSTRUMENT LIST | 13 |
| 2.6 MEASUREMENT UNCERTAINTY | 14 |
| 3 RF OUTPUT POWER | 15 |
| 3.1 LIMIT | 15 |
| 3.2 BLOCK DIAGRAM OF TEST SETUP | 15 |
| 3.2.1 For conducted method | 15 |
| 3.2.2 For radiated method | 16 |
| 3.3 TEST CONDITIONS AND TEST METHOD | 17 |
| 3.4 TEST RESULT | 18 |
| 4 POWER SPECTRAL DENSITY | 19 |
| 4.1 LIMIT | 19 |
| 4.2 BLOCK DIAGRAM OF TEST SETUP | 19 |
| 4.2.1 For conducted method | 19 |
| 4.2.2 For radiated method | 19 |
| 4.3 TEST CONDITIONS AND TEST METHOD | 20 |
| 4.4 TEST RESULT | 20 |
| Test Graphs | 21 |
| 5 DUTY CYCLE, TX-SEQUENCE, TX-GAP | 23 |
| 5.1 LIMIT | 23 |
| 5.2 BLOCK DIAGRAM OF TEST SETUP | 23 |
| 5.2.1 For conducted method | 23 |
| 5.2.2 For radiated method | 24 |
| 5.3 TEST CONDITIONS AND TEST METHOD | 24 |
| 5.4 TEST RESULT | 25 |
| 6 MEDIUM UTILISATION (MU) FACTOR | 26 |
| 6.1 LIMIT | 26 |
| 6.2 CALCULATION PROCEDURE | 26 |
| 6.3 TEST RESULT | 26 |
| 7 OCCUPIED CHANNEL BANDWIDTH | 27 |
| 7.1 LIMIT | 27 |
| 7.2 BLOCK DIAGRAM OF TEST SETUP | 27 |
| 7.2.1 For conducted method | 27 |
| 7.2.2 For radiated method | 28 |
| 7.3 TEST CONDITIONS AND TEST METHOD | 28 |

TEST REPORT

| | | |
|-----------|---|-----------|
| 7.4 | TEST RESULT..... | 29 |
| | <i>Test Graphs</i> | 29 |
| 8 | TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN | 30 |
| 8.1 | LIMIT | 30 |
| 8.2 | BLOCK DIAGRAM OF TEST SETUP | 30 |
| 8.2.1 | <i>For conducted method</i> | 30 |
| 8.2.2 | <i>For radiated method</i> | 31 |
| 8.3 | TEST CONDITIONS AND TEST METHOD | 32 |
| 8.4 | TEST RESULT..... | 32 |
| | <i>Test Graphs</i> | 33 |
| 9 | TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN | 35 |
| 9.1 | LIMIT | 35 |
| 9.2 | BLOCK DIAGRAM OF TEST SETUP | 35 |
| 9.2.1 | <i>For conducted method</i> | 35 |
| 9.2.2 | <i>For radiated method</i> | 36 |
| 9.3 | TEST CONDITIONS AND TEST METHOD | 37 |
| 9.4 | TEST RESULT..... | 38 |
| 10 | ADAPTIVITY (NON-FHSS) | 42 |
| 10.1 | LIMIT | 42 |
| 10.2 | BLOCK DIAGRAM OF TEST SETUP | 43 |
| 10.2.1 | <i>For conducted method</i> | 43 |
| 10.2.2 | <i>For radiated method</i> | 43 |
| 10.3 | TEST CONDITIONS AND TEST METHOD..... | 44 |
| 10.4 | TEST RESULT..... | 44 |
| 11 | RECEIVER BLOCKING | 45 |
| 11.1 | LIMIT | 45 |
| 11.2 | BLOCK DIAGRAM OF TEST SETUP | 47 |
| 11.2.1 | <i>For conducted method</i> | 47 |
| 11.2.2 | <i>For radiated method</i> | 47 |
| 11.3 | TEST CONDITIONS AND TEST METHOD..... | 48 |
| 11.4 | TEST RESULT..... | 49 |
| | <i>Test Graphs</i> | 50 |
| 12 | RECEIVER SPURIOUS EMISSION | 51 |
| 12.1 | LIMIT | 51 |
| 12.2 | BLOCK DIAGRAM OF TEST SETUP | 51 |
| 12.2.1 | <i>For conducted method</i> | 51 |
| 12.2.2 | <i>For radiated method</i> | 52 |
| 12.3 | TEST CONDITIONS AND TEST METHOD..... | 53 |
| 12.4 | TEST PROTOCOL..... | 54 |
| 13 | GEO-LOCATION CAPABILITY | 58 |
| 13.1 | APPLICABILITY..... | 58 |
| 13.2 | REQUIREMENTS..... | 58 |
| 13.3 | DESCRIPTION | 58 |
| | APPENDIX I: PHOTOGRAPH OF EQUIPMENT UNDER TEST | 59 |

Revision History

| Report No. | Version | Description | Issued Date |
|------------------|---------|-------------------------|----------------|
| 230401083SHA-001 | Rev. 01 | Initial issue of report | April 17, 2023 |

Measurement result summary

| TEST ITEM | TEST RESULT | NOTE |
|--|-------------|---|
| RF Output Power | Pass | |
| Power Spectral Density | Pass | |
| Duty Cycle, Tx-sequence, Tx-gap | NA | Only for non-adaptive equipment or mode |
| Medium Utilization (MU) factor | NA | Only for non-adaptive equipment or mode |
| Occupied Channel Bandwidth | Pass | |
| Transmitter unwanted emissions in the out-of-band domain | Pass | |
| Transmitter unwanted emissions in the spurious domain | Pass | |
| Adaptivity (non-FHSS) | NA | Not applied for equipment with e.i.r.p. less than 10dBm |
| Receiver Blocking | Pass | |
| Receiver spurious emission | Pass | |
| Geo-location capability | NA | |

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name : LED Strip T1

Type/Model : LEDS-K01, LEDS-K02, RLS-K01D, RLS-K02D

Brand name : Aqara

Description of EUT : It is a product with Zigbee function, all models are identical except model name.
We tested Zigbee in this report.

Rating : DC 24V

Category of EUT: : Class B

EUT type: : ☒ Table top ☐ Floor standing

Hardware version : X1

Software version : 0.0.0_2224

Sample received : November 25, 2022
date

Date of test : November 25, 2022 to March 31, 2023

1.2 RF Technical Information

| No. | Protocol | Channel Frequency (MHz) | Channel No. |
|--------------------|----------|-------------------------|-------------|
| 1 | Zigbee | 2405 - 2475 | 15 |
| Modulation: O-QPSK | | | |

| Antenna information: | | | |
|----------------------|--------------|------------|------|
| No. | Antenna Type | Gain (dBi) | Note |
| 1 | PCB | 0.5 | - |

| Equipment types | |
|--------------------------------------|---|
| Modulation types: | |
| <input type="checkbox"/> | Frequency Hopping Spread Spectrum (FHSS) equipment, further referred to as FHSS equipment. |
| <input checked="" type="checkbox"/> | Other types of Wideband Data Transmission equipment, further referred to as non-FHSS equipment (e.g. DSSS, OFDM, etc.). |
| Adaptive and non-adaptive equipment: | |
| <input type="checkbox"/> | Non-Adaptive Equipment: |
| <input checked="" type="checkbox"/> | Adaptive Equipment without the possibility to switch to a non-adaptive mode: |
| <input type="checkbox"/> | Adaptive Equipment which can also operate in non-adaptive mode |
| Receiver categories: | |
| <input type="checkbox"/> | Receiver category 1: Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. |
| <input checked="" type="checkbox"/> | Receiver category 2: <ul style="list-style-type: none"> Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % (irrespective of the maximum RF output power); or equipment (adaptive or non-adaptive) with a maximum RF output power greater than 0 dBm e.i.r.p. and less than or equal to 10 dBm e.i.r.p. |
| <input type="checkbox"/> | Receiver category 3: <ul style="list-style-type: none"> Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % (irrespective of the maximum RF output power) or equipment (adaptive or non-adaptive) with a maximum RF output power of 0 dBm e.i.r.p. |

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 11 | 2405 MHz | 19 | 2445 MHz |
| 12 | 2410 MHz | 20 | 2450 MHz |
| 13 | 2415 MHz | 21 | 2455 MHz |
| 14 | 2420 MHz | 22 | 2460 MHz |
| 15 | 2425 MHz | 23 | 2465 MHz |
| 16 | 2430 MHz | 24 | 2470 MHz |
| 17 | 2435 MHz | 25 | 2475 MHz |
| 18 | 2440 MHz | | |

1.3 Description of Test Facility

Name : Intertek Testing Services Shanghai
Address : Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone : 86 21 61278200
Telefax : 86 21 54262353

The test facility is recognized, certified, or accredited by these organizations :

- CNAS Accreditation Lab
Registration No. CNAS L0139
- FCC Accredited Lab
Designation Number: CN1175
- IC Registration Lab
CAB identifier.: CN0051
- VCCI Registration Lab
Registration No.: R-14243, G-10845, C-14723, T-12252
- A2LA Accreditation Lab
Certificate Number: 3309.02

Subcontractor

Name : Fangguang Inspection & Testing Co., Ltd.
Address : Building 09,China Sensor Network International innovation Park,No.200,Linghu Avenue,Wuxi,Jiangsu,China
Telephone : 0510-68790033
Telefax : 0510-68790022

The test facility is recognized, certified, or accredited by these organizations :

- CNAS Accreditation Lab
Registration No. CNAS L9092
- FCC Accredited Lab
Designation Number: CN5037
- NVLAP Lab CODE: 600222-0

2 TEST SPECIFICATIONS

2.1 Standards or specification

EN 300 328 V2.2.2: Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the continuously transmission was applied by following software.

| Software name | Manufacturer | Version | Supplied by |
|---------------|--------------|---------|-------------|
| QCOM_V1.0 | - | V1.0 | Client |

The lowest, middle and highest channel were tested as representatives.

| Frequency Band (MHz) | Modulation | Lowest (L) (MHz) | Middle (M) (MHz) | Highest (H) (MHz) |
|----------------------|------------|------------------|------------------|-------------------|
| 2400-2483.5 | O-QPSK | 2405 | 2440 | 2475 |

2.3 Test peripherals used

| Item No | Description | Band and Model | S/No |
|---------|-----------------|------------------|----------|
| 1 | Laptop computer | TianYi 310-14ISK | MP18DLC6 |

2.4 Record of normal and extreme test conditions

| Test Item | Normal Temperature (°C) | Relative Humidity (%) |
|--|-------------------------|-----------------------|
| RF Output Power | 23.5 | 46 |
| Duty Cycle, Tx-sequence, Tx-gap | | |
| Medium Utilization (MU) factor | | |
| Occupied Channel Bandwidth | | |
| Transmitter unwanted emissions in the out-of-band domain | | |
| Hopping Frequency Separation, Accumulated Transmit time, Frequency Occupation and Hopping Sequence | | |
| Adaptivity (non-FHSS) | | |
| Receiver Blocking | 24.3 | 57 |
| Transmitter unwanted emissions in the spurious domain | | |
| Receiver spurious emission | | |

| Extremes of the operating temperature range as declared by the manufacturer |
|---|
| -10 °C to 40 °C |

| Abbreviations | |
|---------------|--------------------------|
| Tnom | Normal Temperature |
| Tmin | Extreme Low Temperature |
| Tmax | Extreme High Temperature |

2.5 Instrument list

| Radiated Emission | | | | | |
|-------------------------------------|--|--------------|------------------|--------------|------------|
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| <input checked="" type="checkbox"/> | Spectrum Analyzer | KEYSIGHT | N9010A | 186060020 | 2023-07-24 |
| <input checked="" type="checkbox"/> | Spectrum Analyzer | R&S | FSV3044 | I00641 | 2023-07-24 |
| <input checked="" type="checkbox"/> | Bi-log Antenna | Schwarzbeck | VULB 9163 | MY50510140 | 2023-10-19 |
| <input checked="" type="checkbox"/> | Horn Antenna | Schwarzbeck | BBHA9120D | 201013401 | 2023-08-19 |
| <input checked="" type="checkbox"/> | Amplifier | Tonscend | TAP01018048 | AP20E8060076 | 2023-05-08 |
| <input checked="" type="checkbox"/> | Amplifier | Tonscend | TAP037030 | EC 4792-3 | 2022-07-08 |
| <input checked="" type="checkbox"/> | Amplifier | Tonscend | TAP9E6343 | EC5262 | 2022-06-19 |
| <input checked="" type="checkbox"/> | Test software | tonscend | JS36-RSE/2.5.1.5 | | |
| RF test | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| <input checked="" type="checkbox"/> | Simultaneous sampling DAQ | TONSCEND | JS0806-2 | 186060020 | 2023-07-24 |
| <input checked="" type="checkbox"/> | Pulse power sensor | TONSCEND | u2021A | I00641 | 2023-07-24 |
| <input checked="" type="checkbox"/> | Spectrum Analyzer | Agilent | N9020A | MY50510140 | 2023-10-19 |
| <input checked="" type="checkbox"/> | Signal Generator | Anritsu | MG3694A | #050125 | 2023-08-16 |
| <input checked="" type="checkbox"/> | High and low temperature humid heat test chamber | HOSON | HS01060SDF | 201013401 | 2023-08-19 |
| <input checked="" type="checkbox"/> | BT/WIFI System | TONSCEND | JS1120-3 | | |

2.6 Measurement Uncertainty

| Item No. | Test Items | | | Expanded Uncertainty (k=2) |
|----------|------------------------------|------------|---------------|-------------------------------|
| 1 | RF frequency | | | 6.0×10 ⁻⁶ |
| 2 | RF power conducted | | | 0.78 dB |
| 3 | Occupied channel bandwidth | | | 0.4 dB |
| 4 | Unwanted emission, conducted | | | 0.68 dB |
| 5 | Humidity | | | 6 % |
| 6 | Temperature | | | 2°C |
| 7 | Radiated Emission | Horizontal | 30MHz~1000MHz | 4.3dB |
| 8 | | | 1GHz~12.75GHz | 5.6dB |
| 9 | | Vertical | 30MHz~1000MHz | 4.3dB |
| 10 | | | 1GHz~12.75GHz | 5.6dB |

3 RF output power

Test result: Pass

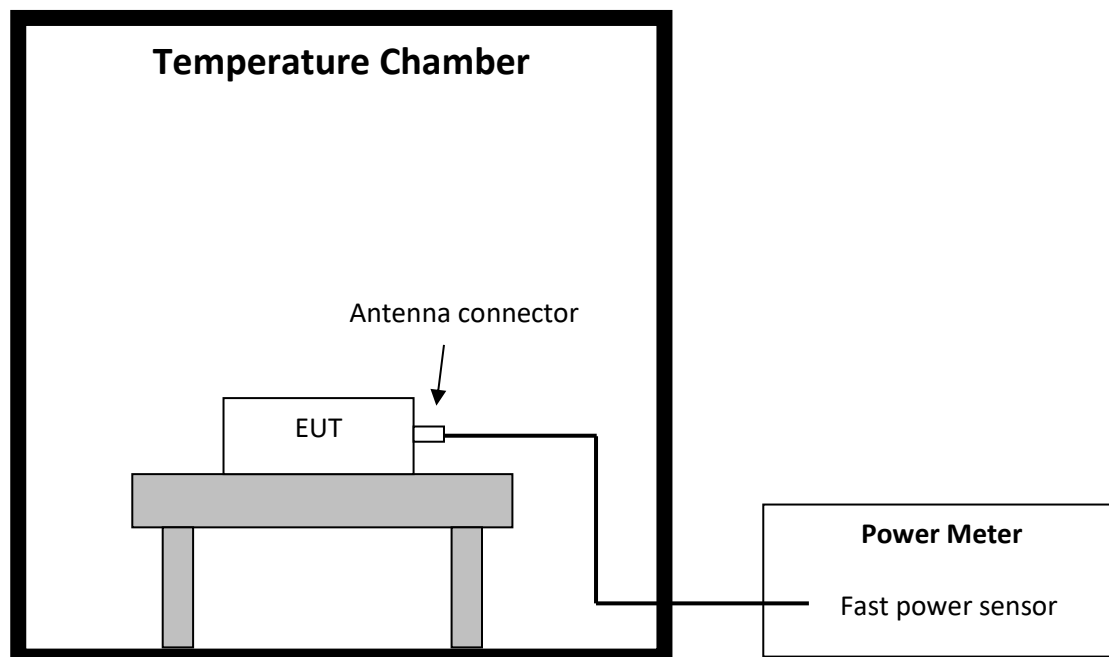
3.1 Limit

| Mode | Limit | |
|--------------|-------|-------|
| | (mW) | (dBm) |
| Adaptive | 100 | 20 |
| Non-adaptive | 100 | 20 |

Note: the limit for non-adaptive device is declared by the applicant.

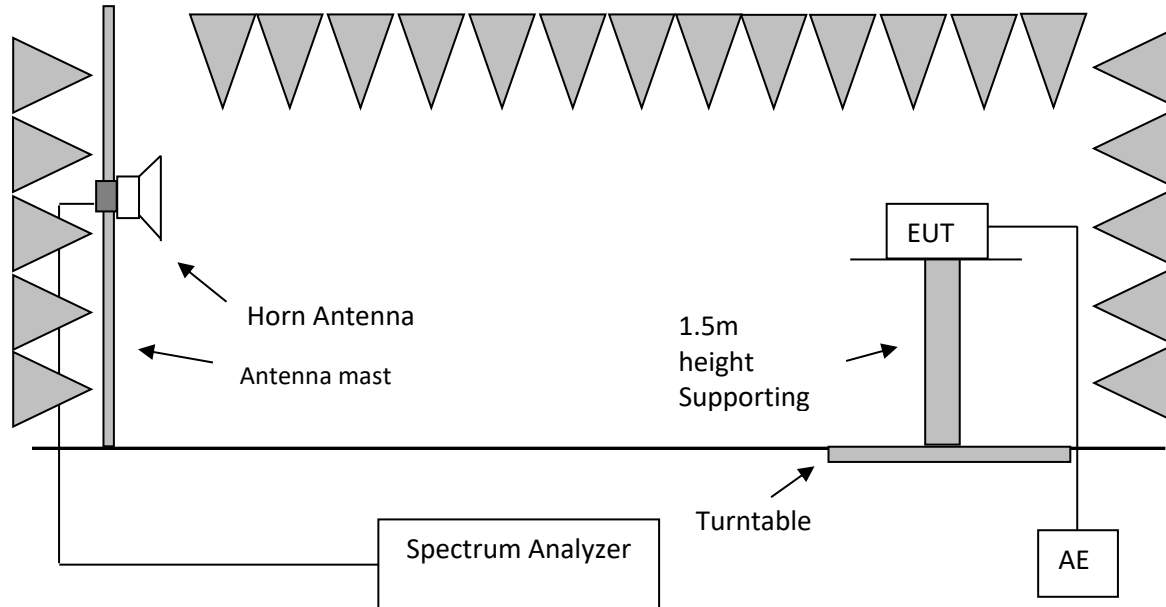
3.2 Block Diagram of Test Setup

3.2.1 For conducted method

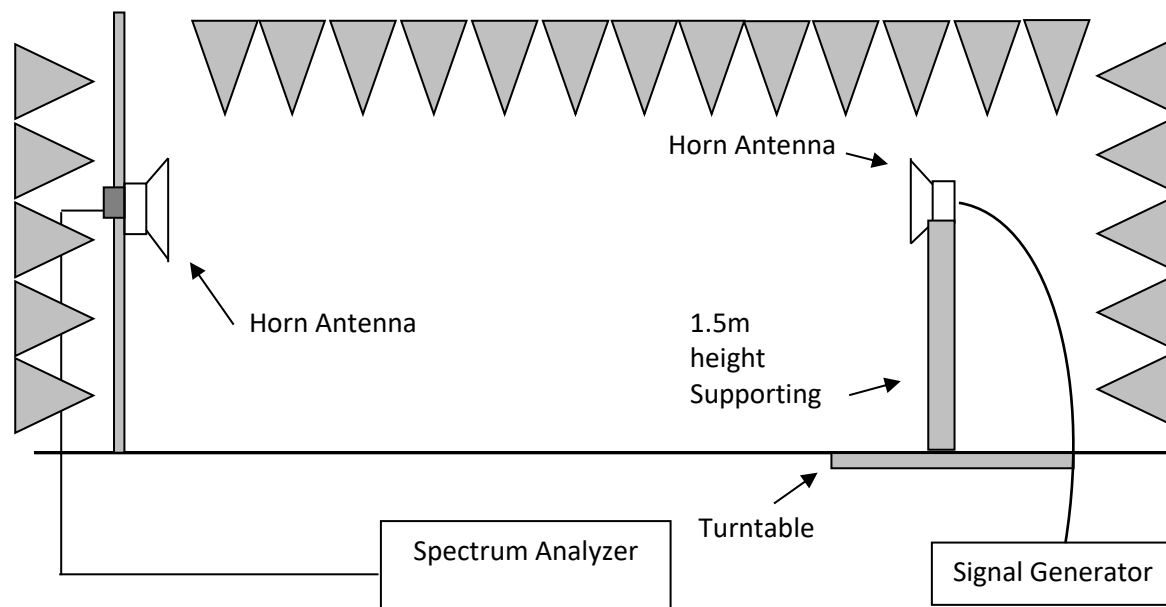


3.2.2 For radiated method

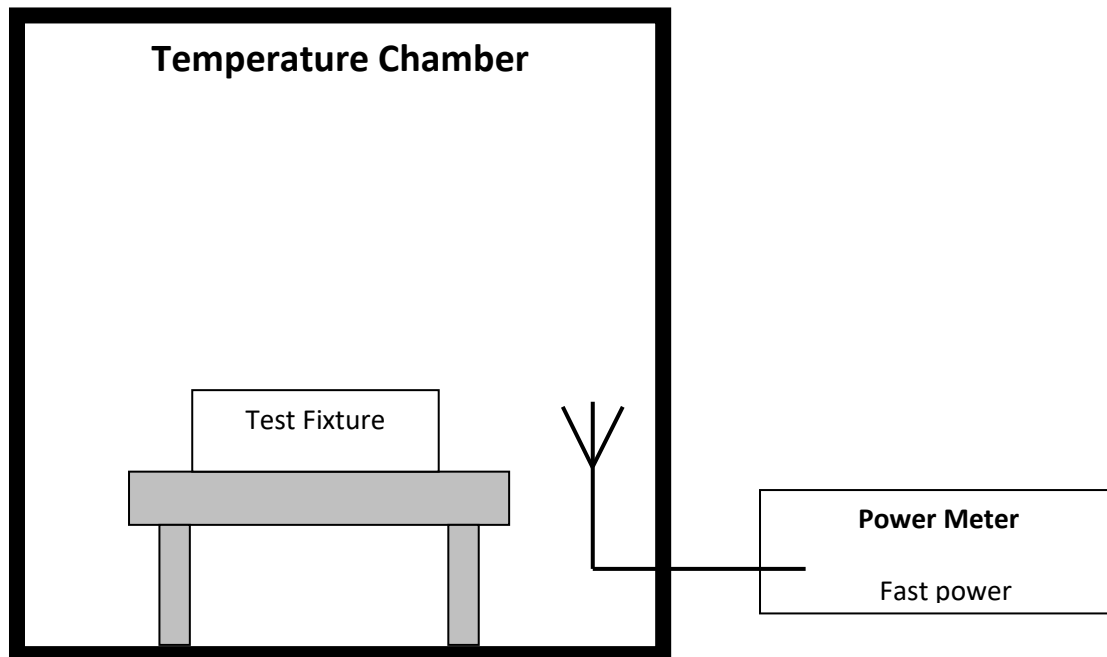
Step one



Step two



Step three



3.3 Test Conditions and Test Method

The measurements for RF output power shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.

In case of Adaptive equipment, the equipment shall be operated under its worst case configuration w.r.t. RF output power. In case of non-Adaptive equipment, the equipment shall be operated under its worst case configuration w.r.t. Medium Utilization factor.

For FHSS equipment, the measurements shall be performed during normal operation (hopping) and the equipment is assumed to have no blacklisted frequencies (operating on all hopping frequencies).

For non-FHSS equipment, the measurement shall be performed at the lowest, the middle, and the highest channel on which the equipment can operate. These frequencies shall be recorded.

☒ For conducted method

The EUT was connected to the power meter directly. Please refer to EN 300 328 Clause 5.4.2.2.1 for test method.

☐ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.2.2.2 and for test method.

3.4 Test Result

| Mode | Channel | Condition | EIRP (dBm) | Limit (dBm) | Pass/Fail |
|--------|---------|-----------|------------|-------------|-----------|
| Zigbee | L | Tnom | 6.48 | 20 | Pass |
| | | Tmin | 6.48 | | |
| | | Tmax | 6.46 | | |
| | M | Tnom | 6.20 | 20 | Pass |
| | | Tmin | 6.20 | | |
| | | Tmax | 6.18 | | |
| | H | Tnom | 6.02 | 20 | Pass |
| | | Tmin | 6.03 | | |
| | | Tmax | 6.01 | | |

4 Power Spectral Density

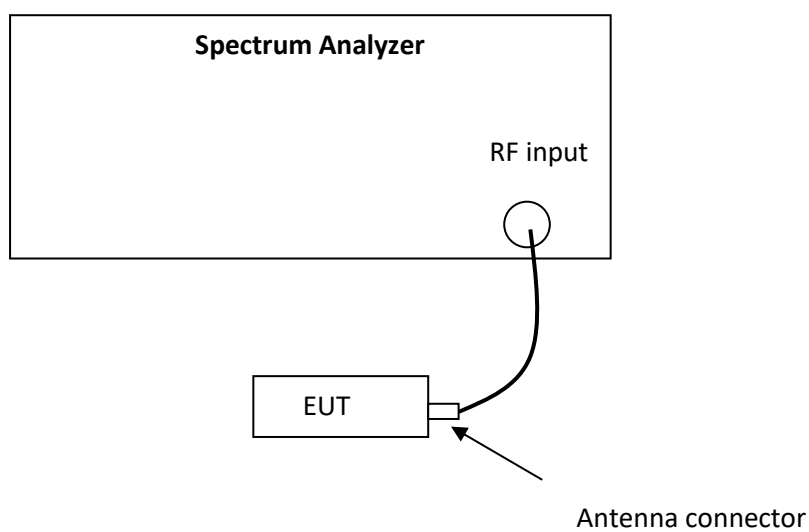
Test result: Pass

4.1 Limit

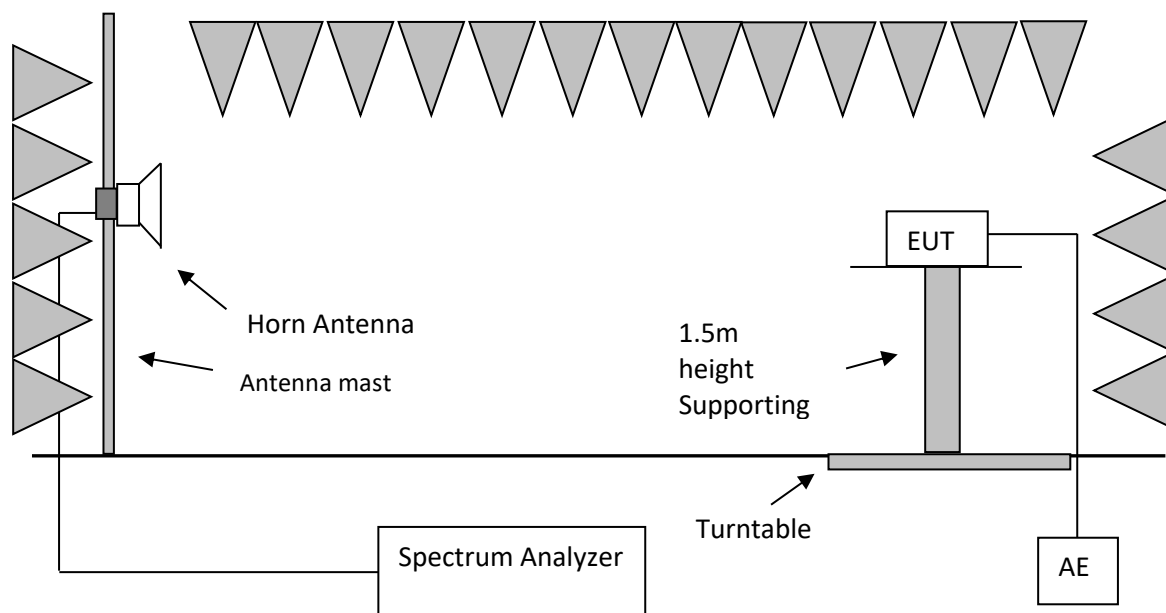
The maximum Power Spectral Density for non-FHSS equipment is 10 dBm per MHz.

4.2 Block Diagram of Test Setup

4.2.1 For conducted method



4.2.2 For radiated method



4.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

The measurement shall be repeated for the equipment being configured to operate at the lowest, the middle, and the highest frequency of the stated frequency range. These frequencies shall be recorded.

☒ For conducted method

The EUT was connected to the spectrum analyzer directly. Please refer to EN 300 328 Clause 5.4.3.2.1 for test method.

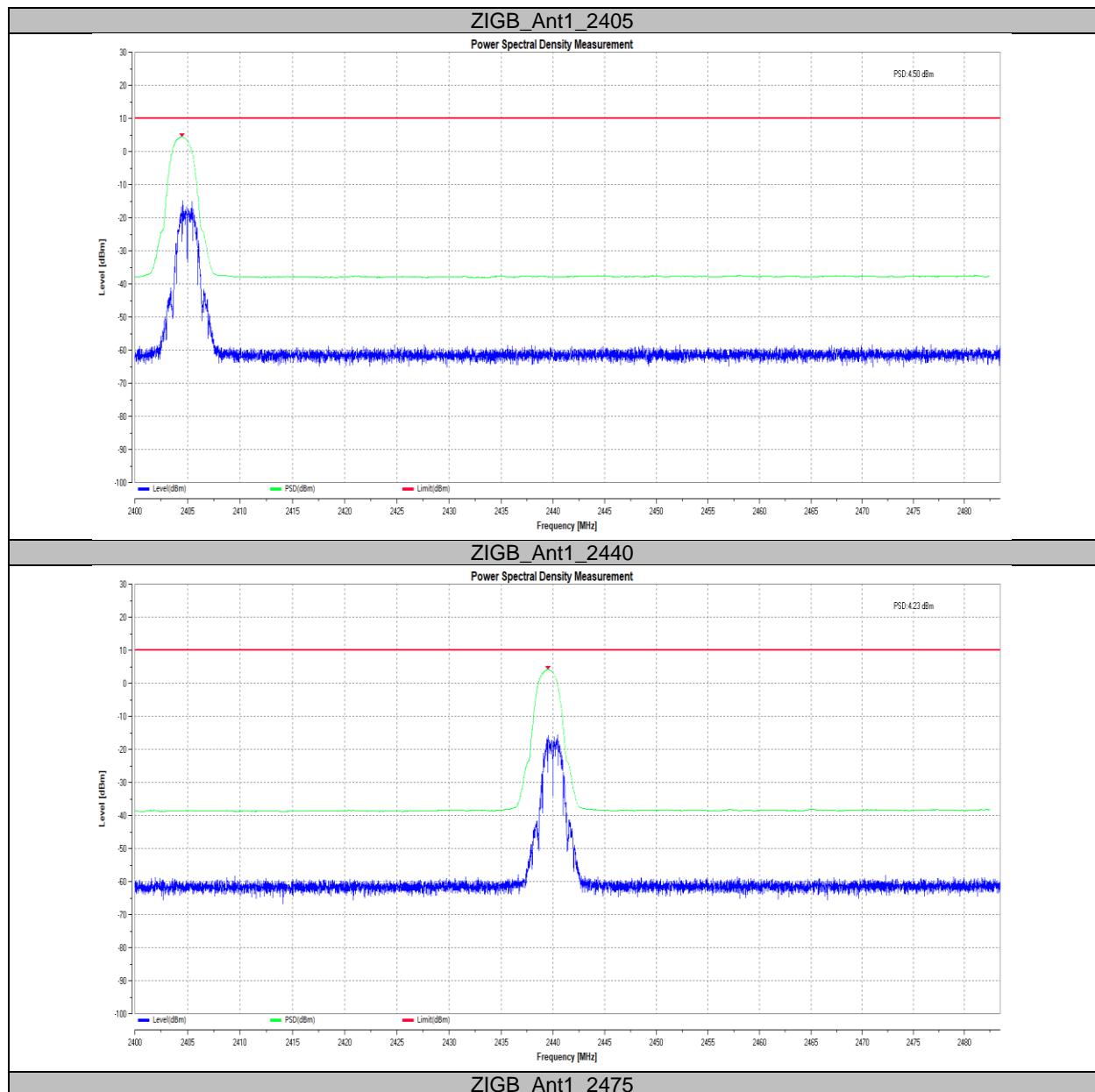
☐ For radiated method

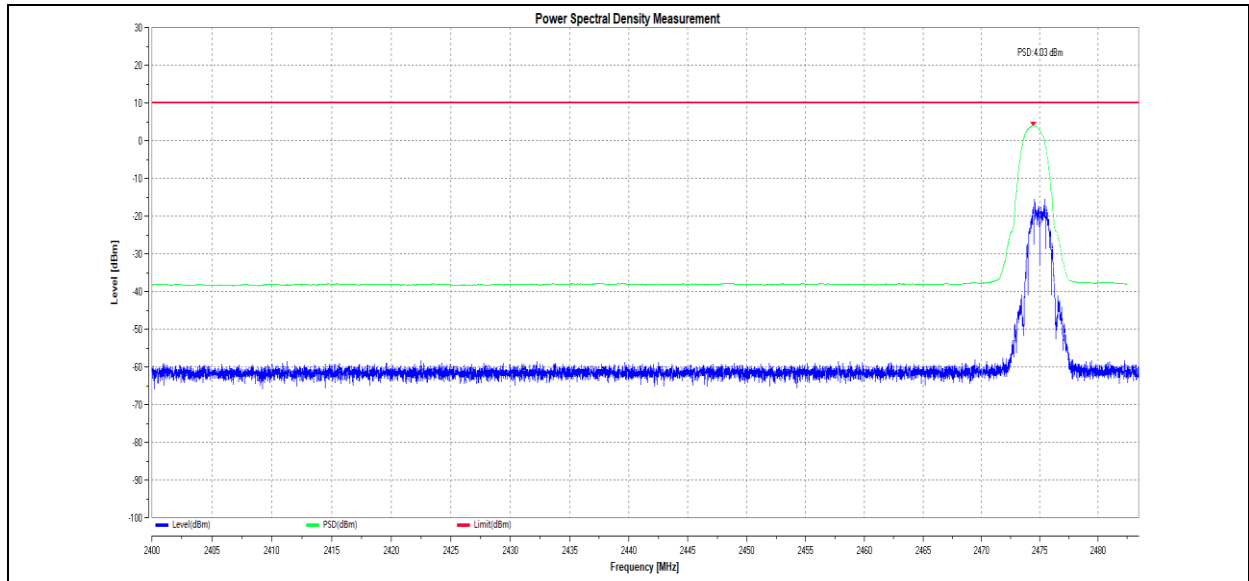
The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.3.2.2 for test method.

4.4 Test Result

| Mode | Channel | Power Density (dBm/MHz) | Limit (dBm/MHz) | Pass/Fail |
|--------|---------|-------------------------|-----------------|-----------|
| Zigbee | L | 4.50 | 10 | Pass |
| | M | 4.23 | 10 | Pass |
| | H | 4.03 | 10 | Pass |

Test Graphs





5 Duty Cycle, Tx-sequence, Tx-gap

Test result: NA

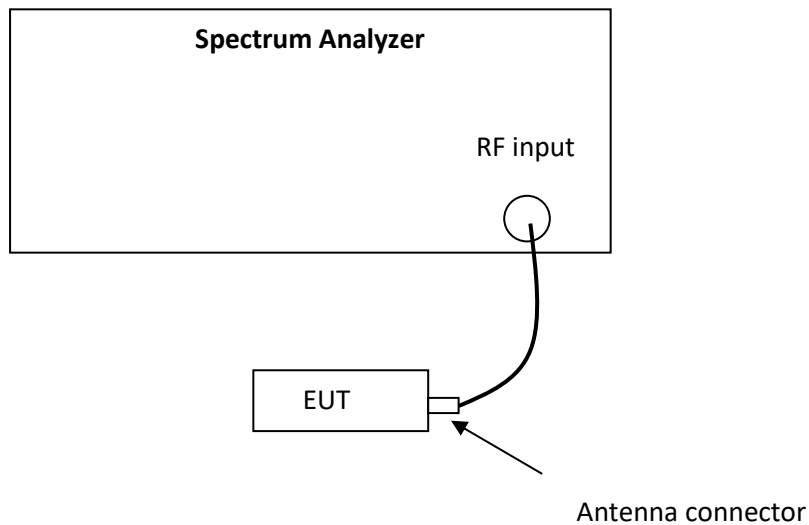
5.1 Limit

| Mode | Maximum Duty Cycle (%) | Maximum Tx-sequence (ms) | Minimum Tx-gap (ms) |
|--------------|------------------------|--------------------------|---------------------|
| Non-adaptive | 100 | 10 | 3.5 |

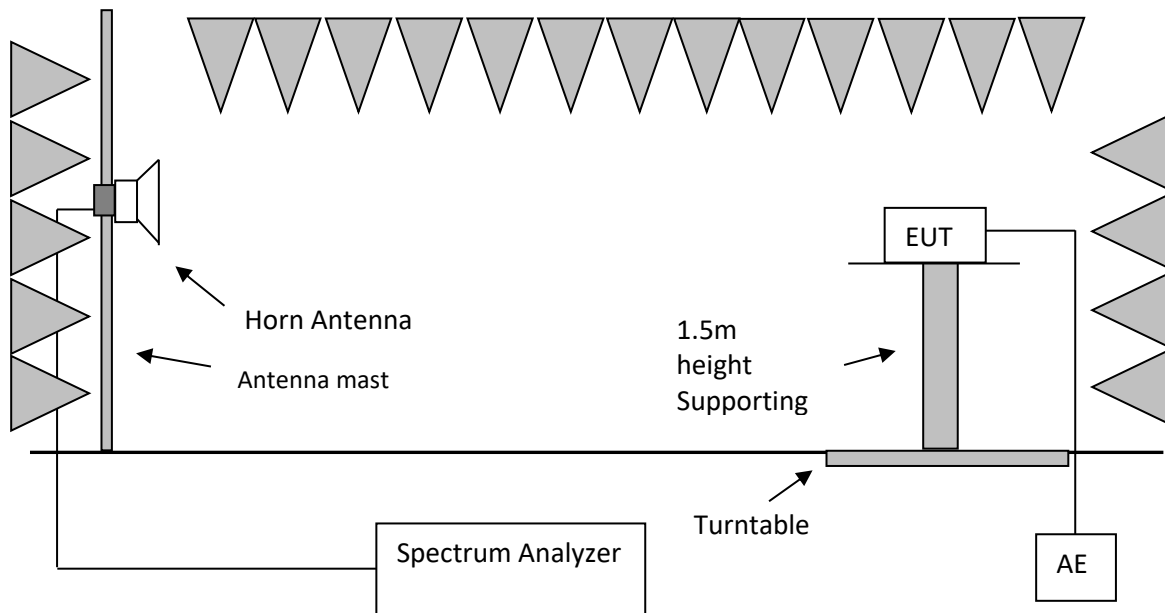
Note: 1. The limit for maximum duty cycle is declared by the applicant.
2. This test is not applied to the device / mode with EIRP less than 10dBm.

5.2 Block Diagram of Test Setup

5.2.1 For conducted method



5.2.2 For radiated method



5.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

In case of Adaptive equipment, the equipment shall be operated under its worst case configuration w.r.t. RF output power.

In case of non-Adaptive equipment, the equipment shall be operated under its worst case configuration w.r.t. Medium Utilization factor.

For FHSS equipment, the measurements shall be performed during normal operation (hopping) and the equipment is assumed to have no blacklisted frequencies (operating on all hopping frequencies).

For non-FHSS equipment, the measurement shall be performed at the lowest, the middle, and the highest channel on which the equipment can operate. These frequencies shall be recorded.

☐ For conducted method

The EUT was connected to the power meter directly. Please refer to EN 300 328 Clause 5.4.2.2.1 for test method.

☐ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.2.2.2 and for test method.

5.4 Test Result

| Maximum Duty Cycle | | | |
|--------------------|--------------------|-----------|-----------|
| Channel | Observed value (%) | Limit (%) | Pass/Fail |
| L | | 100 | |
| M | | | |
| H | | | |

| Maximum Tx-sequence | | | |
|---------------------|---------------------|------------|-----------|
| Channel | Observed value (ms) | Limit (ms) | Pass/Fail |
| L | | 10 | |
| M | | | |
| H | | | |

| Minimum Tx-gap | | | |
|----------------|---------------------|------------|-----------|
| Channel | Observed value (ms) | Limit (ms) | Pass/Fail |
| L | | 3.5 | |
| M | | | |
| H | | | |

6 Medium Utilisation (MU) factor

Test result: NA

6.1 Limit

| Mode | Maximum MU factor (%) |
|---|-----------------------|
| Non-adaptive | 10 |
| Note: this requirement does not apply for non-FHSS equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-FHSS equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p. | |

6.2 Calculation Procedure

MU factor = (RF output power / 100 mW) * Duty Cycle

6.3 Test Result

| MU factor | | | |
|-----------|----------------------|-----------|-----------|
| Channel | Calculated value (%) | Limit (%) | Pass/Fail |
| L | | ≤ 10 | |
| M | | | |
| H | | | |

7 Occupied Channel Bandwidth

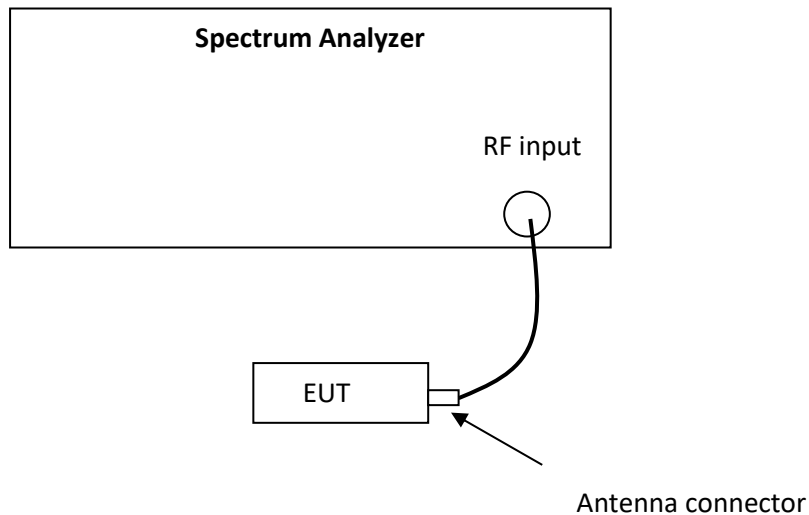
Test result: Pass

7.1 Limit

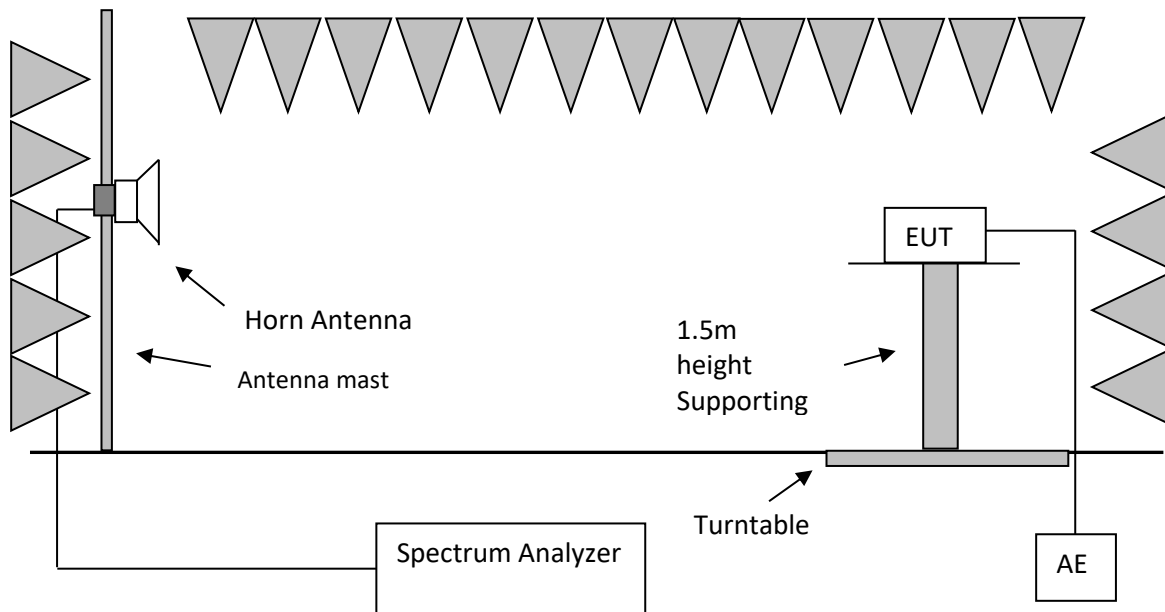
- ☒ Occupied channel Bandwidth shall fall within the band 2400-2483.50MHz.
- ☐ For non-adaptive non-FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth shall be equal to or less than 20 MHz.

7.2 Block Diagram of Test Setup

7.2.1 For conducted method



7.2.2 For radiated method



7.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs).

For FHSS equipment having overlapping channels, special software might be required to force the UUT to hop or transmit on a single Hopping Frequency.

The measurement shall be performed only on the lowest and the highest frequency within the stated frequency range. The frequencies on which the tests were performed shall be recorded.

If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then each channel bandwidth shall be tested separately.

☒ For conducted method

The EUT was connected to the spectrum analyzer directly. Please refer to EN 300 328 Clause 5.4.7.2.1 for test method.

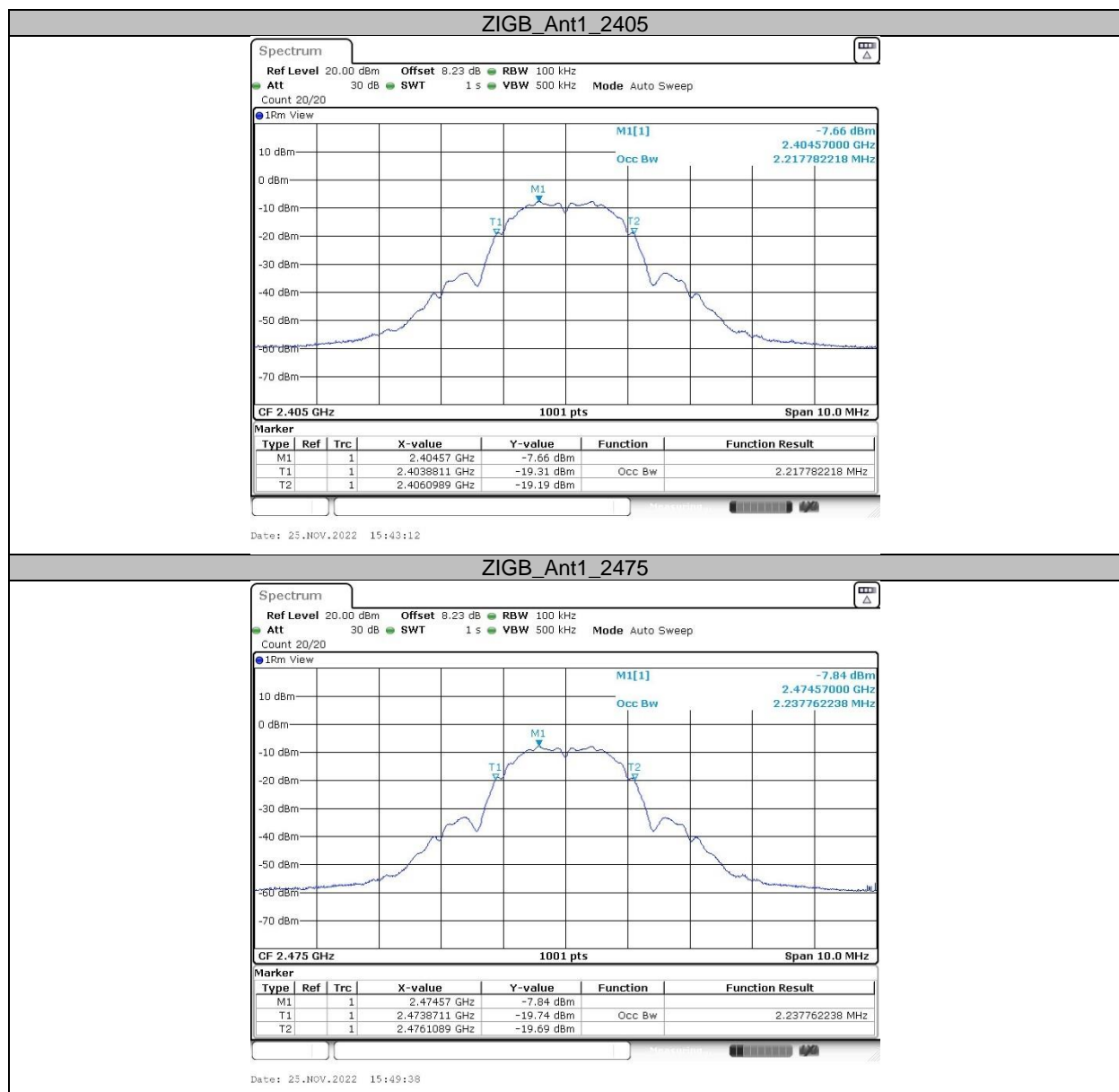
☐ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.7.2.2 and for test method.

7.4 Test Result

| Mode | Channel | 99% Bandwidth (MHz) | F _L at 99% BW (MHz) | F _H at 99% BW (MHz) | Limit (MHz) | Pass/Fail |
|--------|---------|---------------------|--------------------------------|--------------------------------|----------------|-----------|
| Zigbee | L | 2.218 | 2403.8811 | 2406.0989 | 2400 to 2483.5 | Pass |
| | H | 2.238 | 2473.8711 | 2476.1089 | | Pass |

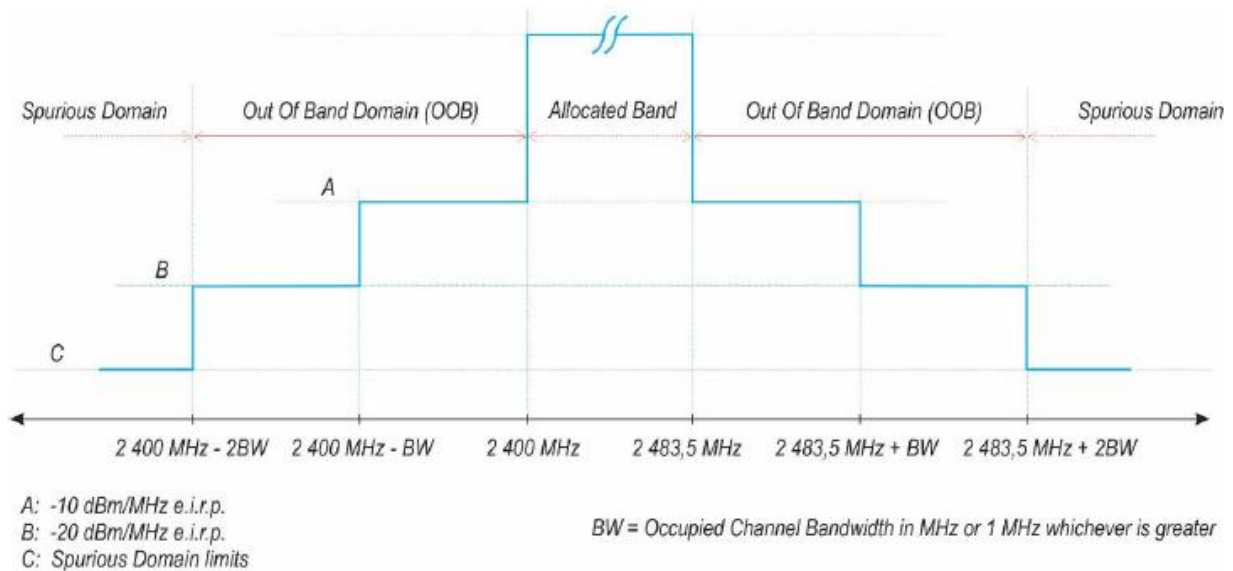
Test Graphs



8 Transmitter unwanted emissions in the out-of-band domain

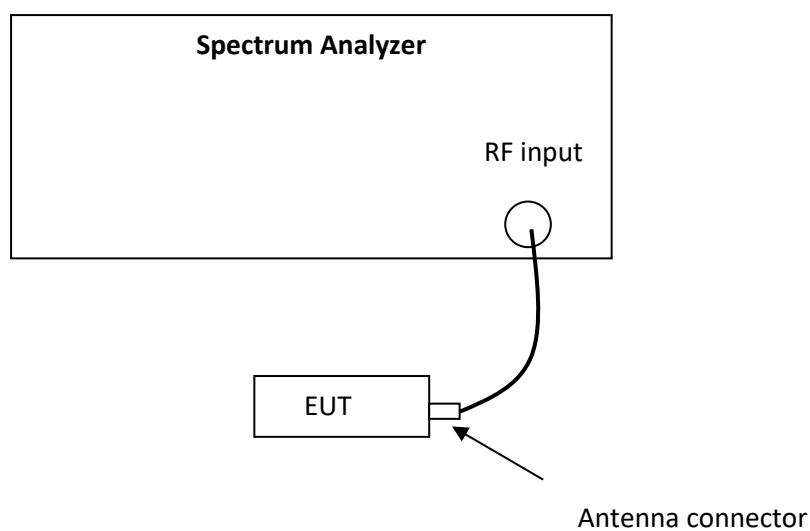
Test result: Pass

8.1 Limit



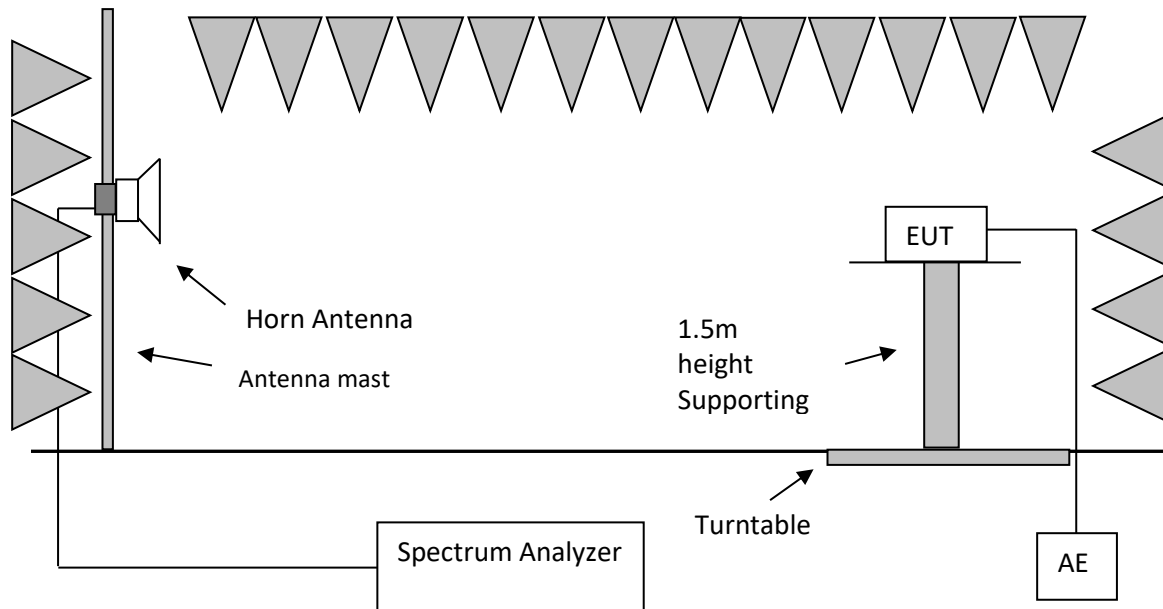
8.2 Block Diagram of Test Setup

8.2.1 For conducted method

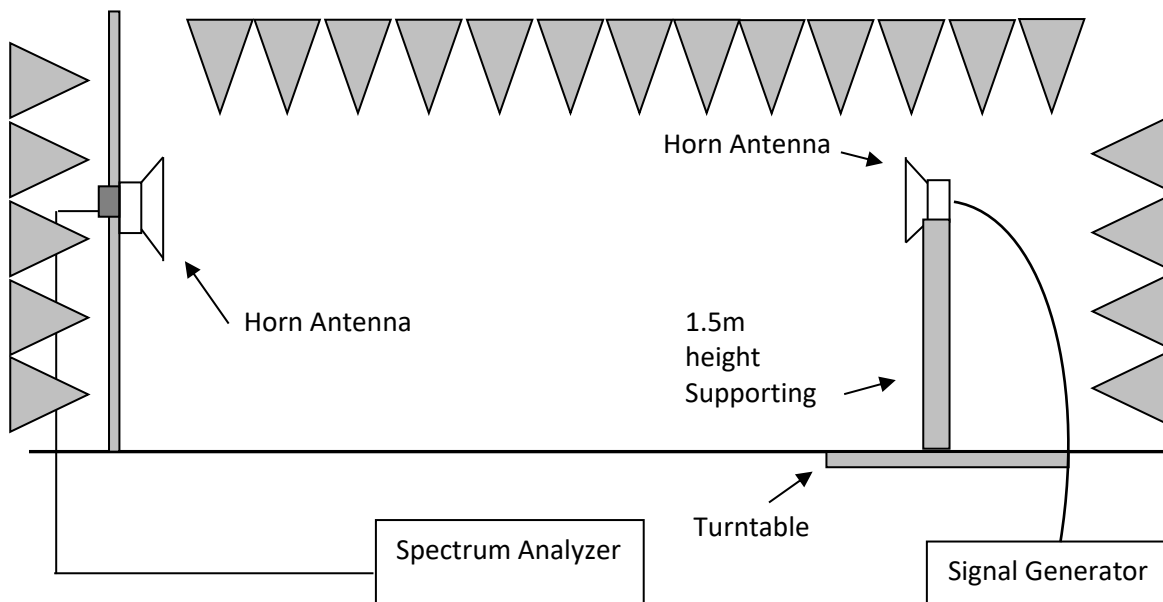


8.2.2 For radiated method

Step one



Step two



8.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

For FHSS equipment, the measurements shall be performed during normal operation (hopping).

For non-FHSS equipment, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.

The equipment shall be configured to operate under its worst case situation with respect to output power.

If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then each channel bandwidth shall be tested separately.

☒ For conducted method

The EUT was connected to the spectrum analyzer directly. Please refer to EN 300 328 Clause 5.4.8.2.1 for test method.

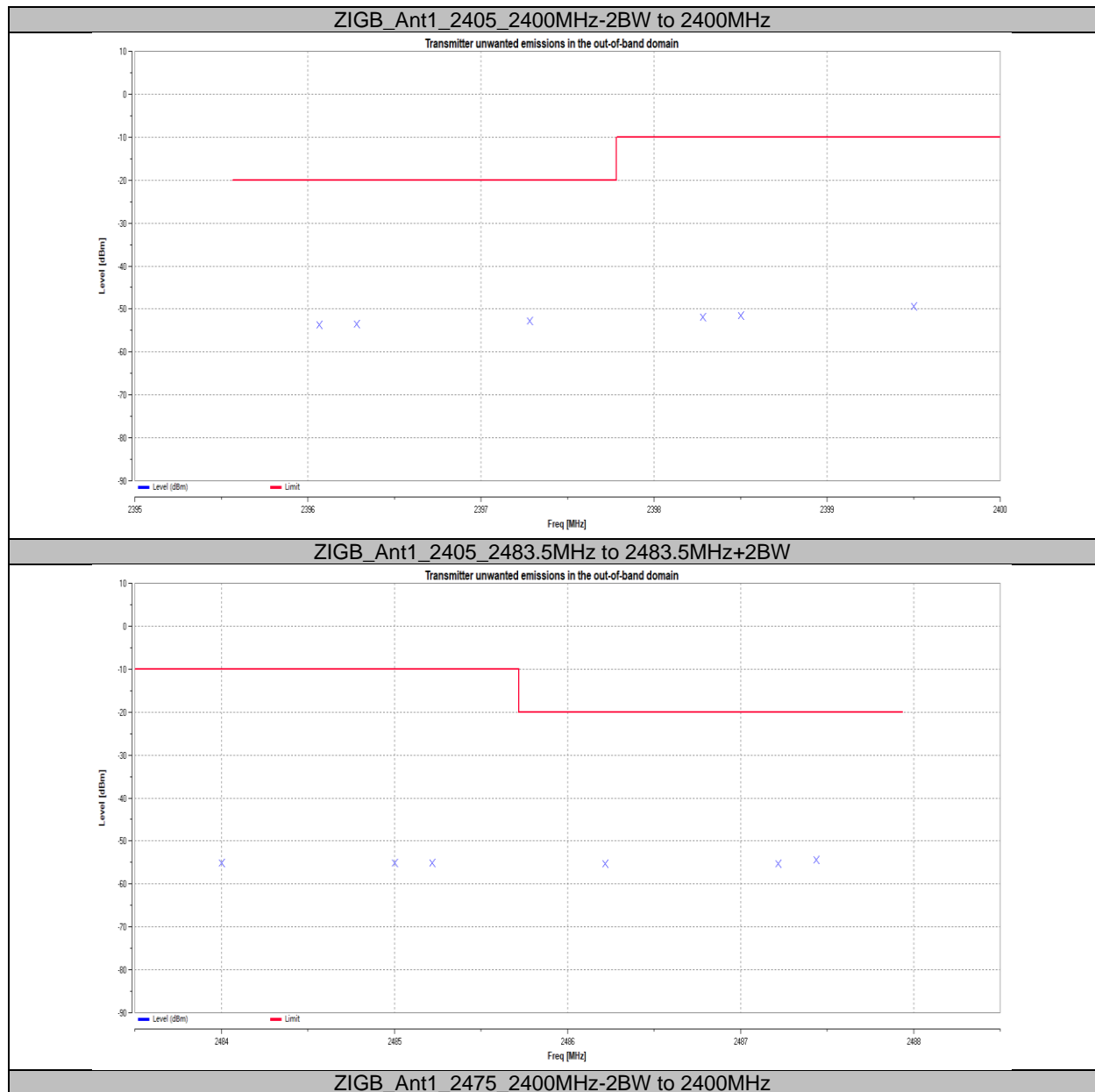
☐ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.8.2.2 for test method.

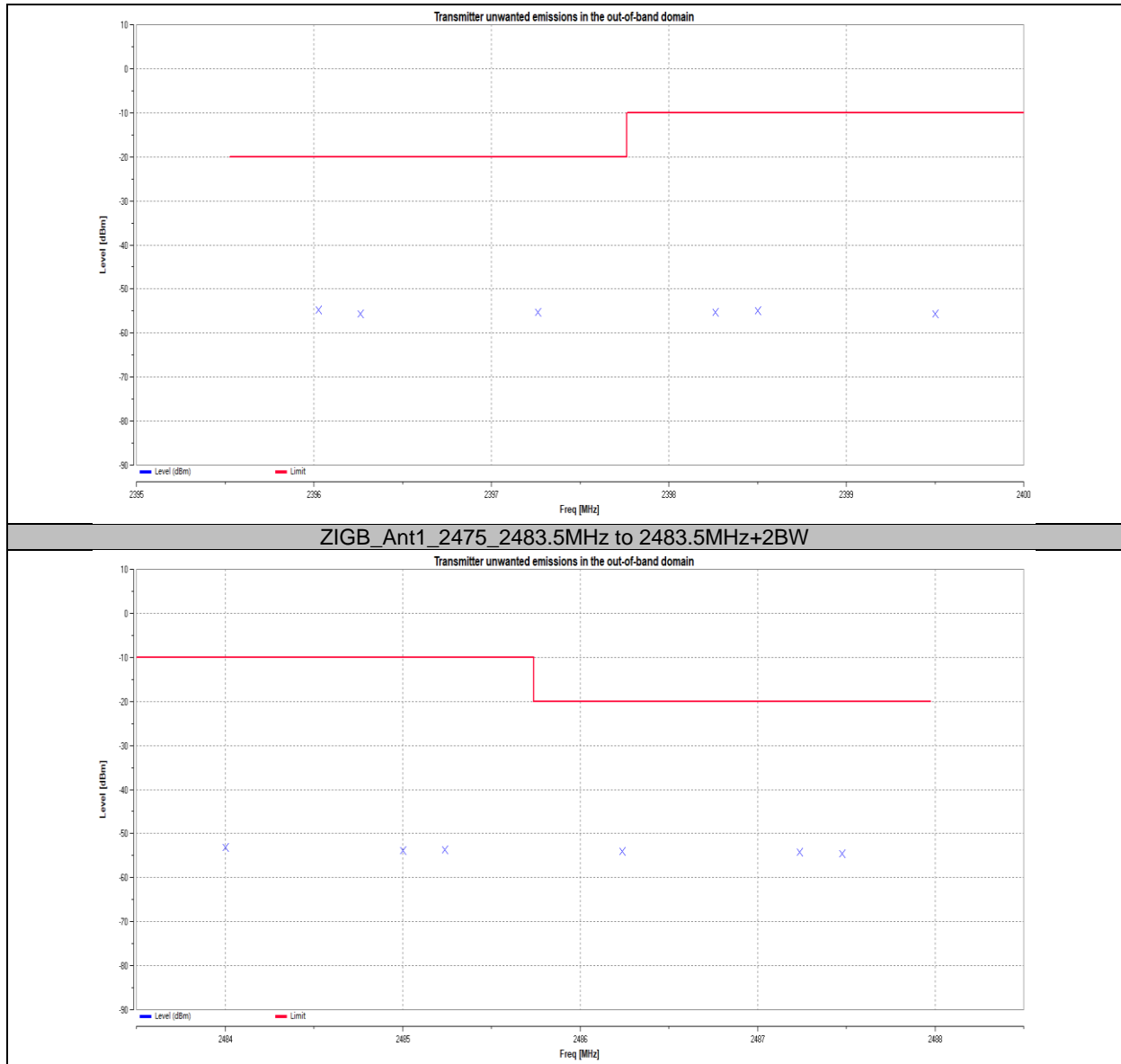
8.4 Test Result

| Mode | Channel | Out-of-band emission | | | |
|--------|---------|-------------------------|------------------------|-----------------|-----------|
| | | Test Frequency (MHz) | OOB Emission (dBm/MHz) | Limit (dBm/MHz) | Pass/Fail |
| Zigbee | L | 2400-BW ~ 2400 | -49.48 | -10 | Pass |
| | | 2400-2BW ~ 2400-BW | -52.85 | -20 | Pass |
| | H | 2483.5 ~ 2483.5+BW | -53.17 | -10 | Pass |
| | | 2483.5+BW ~ 2483.5+2*BW | -54.01 | -20 | Pass |

Test Graphs



TEST REPORT



9 Transmitter unwanted emissions in the spurious domain

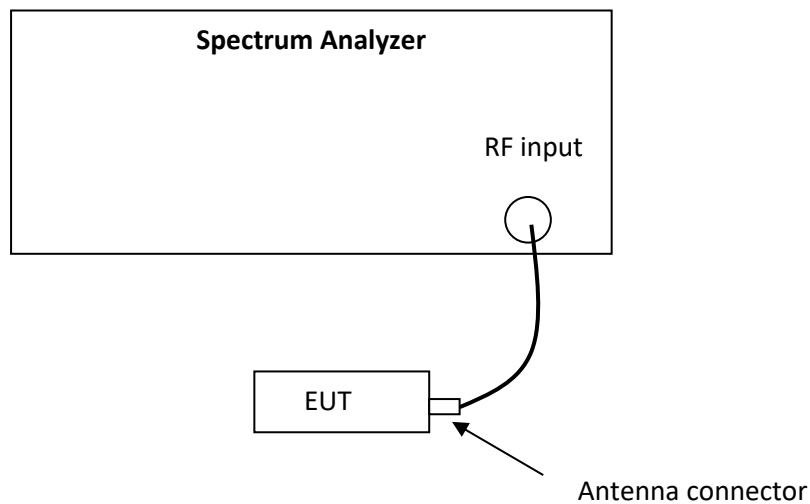
Test result: Pass

9.1 Limit

| Frequency range | Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz) | Bandwidth |
|---------------------|---|-----------|
| 30 MHz to 47 MHz | -36 dBm | 100 kHz |
| 47MHz to 74MHz | -54 dBm | 100 kHz |
| 74 MHz to 87,5 MHz | -36 dBm | 100 kHz |
| 87,5 MHz to 118 MHz | -54 dBm | 100 kHz |
| 118 MHz to 174 MHz | -36 dBm | 100 kHz |
| 174 MHz to 230 MHz | -54 dBm | 100 kHz |
| 230 MHz to 470 MHz | -36 dBm | 100 kHz |
| 470 MHz to 694 MHz | -54 dBm | 100 kHz |
| 694 MHz to 1 GHz | -36 dBm | 100 kHz |
| 1 GHz to 12,75 GHz | -30 dBm | 1 MHz |

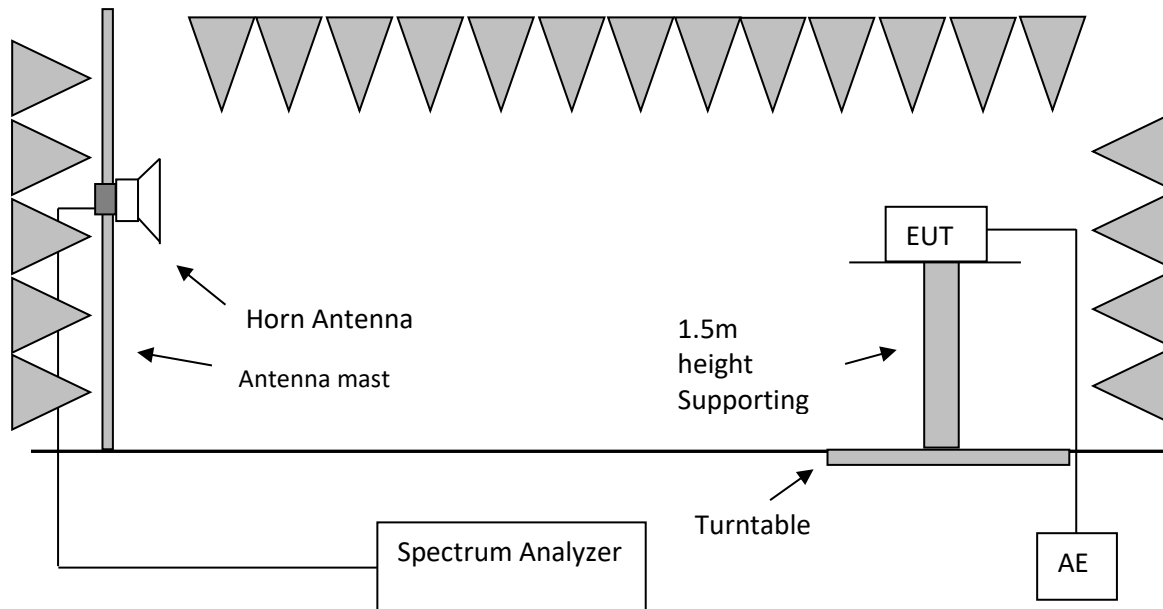
9.2 Block Diagram of Test Setup

9.2.1 For conducted method

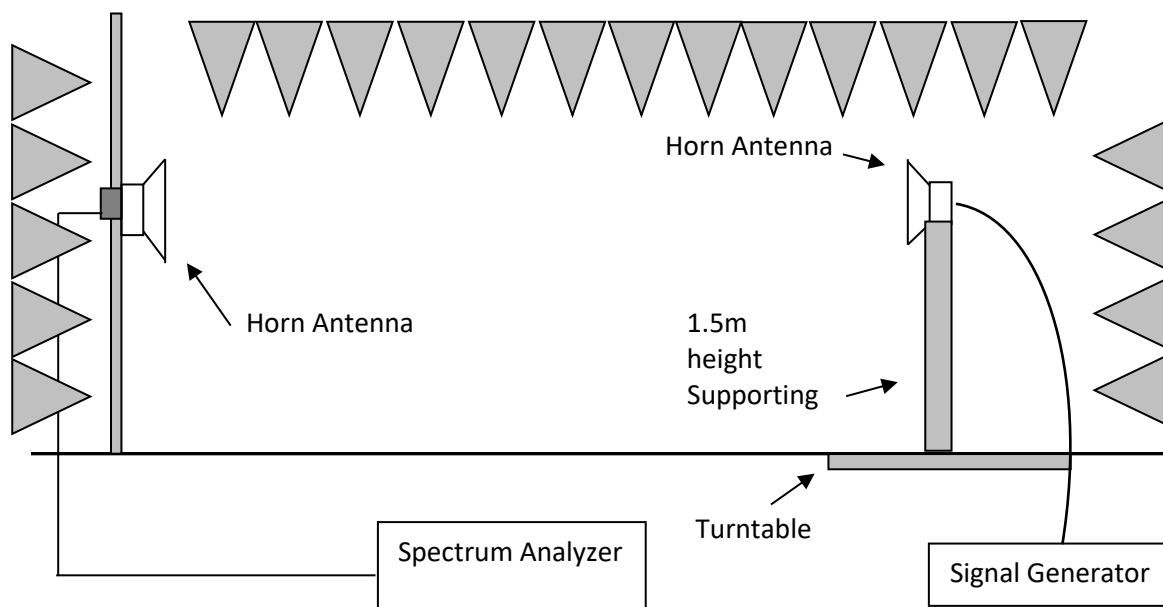


9.2.2 For radiated method

Step one



Step two



Note: for frequency lower than the 1GHz, the horn antennas among the two block diagrams above should be replaced with dipole antennas (or other antennas provided they can be referenced to a dipole).

9.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

For FHSS equipment, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. When this is not possible, the measurement shall be performed during normal operation (hopping).

For non-FHSS equipment, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.

The equipment shall be configured to operate under its worst case situation with respect to output power.

If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then the equipment shall be configured to operate under its worst case situation with respect to spurious emissions.

☐ For conducted method

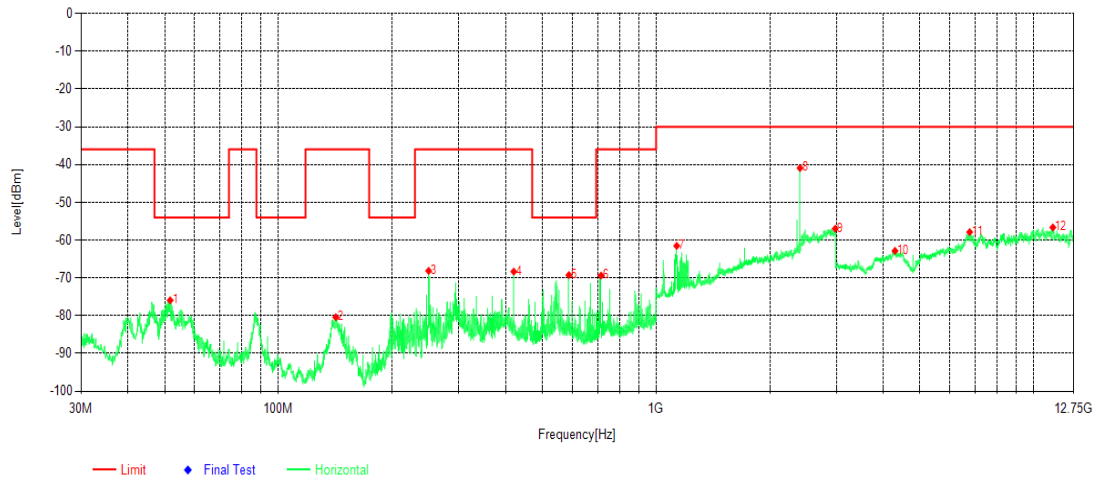
The EUT was connected to the spectrum analyzer directly. Please refer to EN 300 328 Clause 5.4.9.2.1 for test method.

☒ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.9.2.2 for test method.

9.4 Test Result

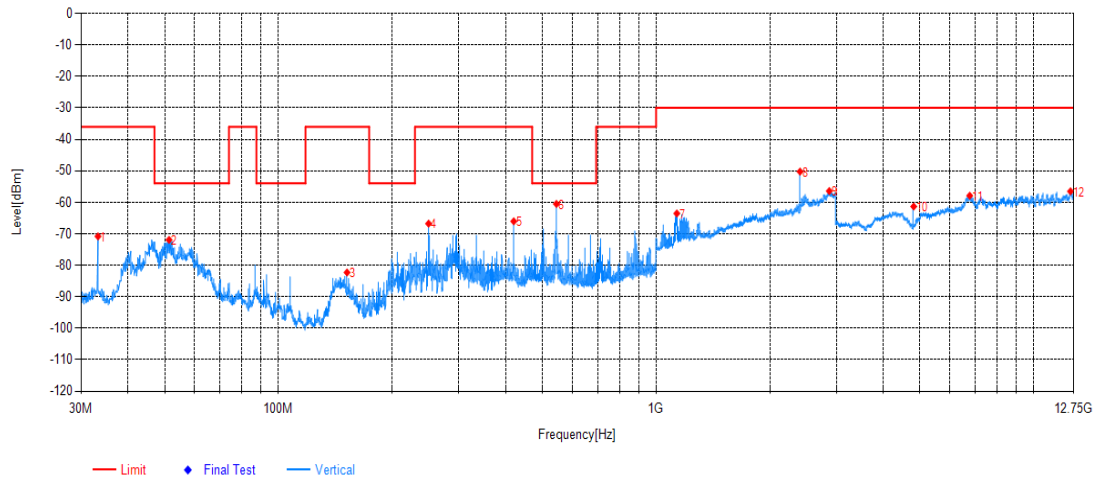
2405MHz
Horizontal



Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| 1 | 51.728 | -58.81 | -75.94 | -54.00 | 21.94 | -17.13 | RMS | Horizontal |
| 2 | 141.938 | -61.50 | -80.40 | -36.00 | 44.40 | -18.90 | RMS | Horizontal |
| 3 | 249.996 | -52.29 | -68.15 | -36.00 | 32.15 | -15.86 | RMS | Horizontal |
| 4 | 419.94 | -57.12 | -68.35 | -36.00 | 32.35 | -11.23 | RMS | Horizontal |
| 5 | 587.944 | -61.19 | -69.27 | -54.00 | 15.27 | -8.08 | RMS | Horizontal |
| 6 | 715.014 | -63.18 | -69.41 | -36.00 | 33.41 | -6.23 | RMS | Horizontal |
| 7 | 1134.2 | -59.69 | -61.53 | -30.00 | 31.53 | -1.84 | RMS | Horizontal |
| 8 | 2405.4 | -50.88 | -40.93 | -30.00 | 10.93 | 9.95 | RMS | Horizontal |
| 9 | 2980 | -70.73 | -57.01 | -30.00 | 27.01 | 13.72 | RMS | Horizontal |
| 10 | 4291.875 | -60.77 | -62.86 | -30.00 | 32.86 | -2.09 | RMS | Horizontal |
| 11 | 6768.375 | -63.47 | -57.89 | -30.00 | 27.89 | 5.58 | RMS | Horizontal |
| 12 | 11236.8 | -68.35 | -56.65 | -30.00 | 26.65 | 11.70 | RMS | Horizontal |

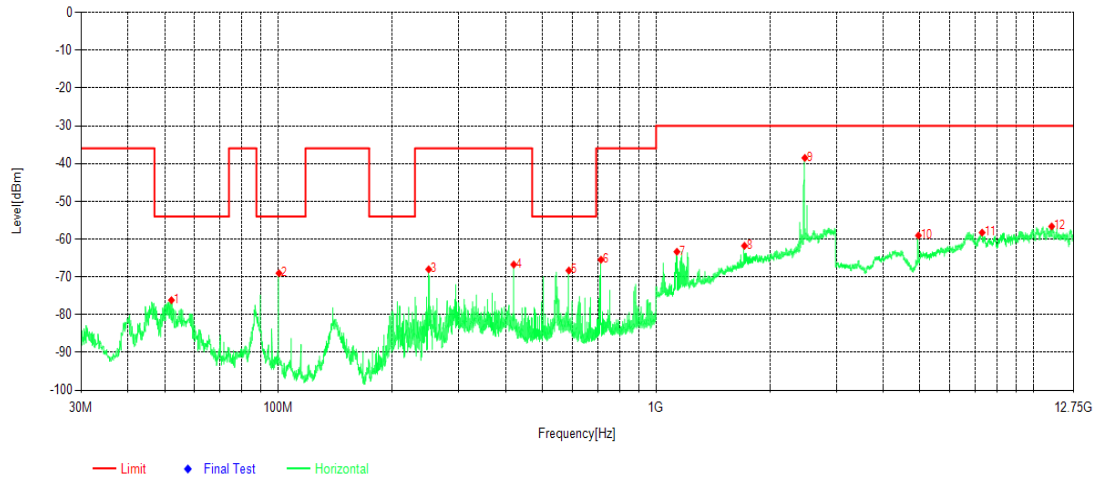
Vertical



Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1 | 33.298 | -54.36 | -70.83 | -36.00 | 34.83 | -16.47 | RMS | Vertical |
| 2 | 51.34 | -58.62 | -71.91 | -54.00 | 17.91 | -13.29 | RMS | Vertical |
| 3 | 152.026 | -63.76 | -82.29 | -36.00 | 46.29 | -18.53 | RMS | Vertical |
| 4 | 249.996 | -50.51 | -66.77 | -36.00 | 30.77 | -16.26 | RMS | Vertical |
| 5 | 419.94 | -54.94 | -66.04 | -36.00 | 30.04 | -11.10 | RMS | Vertical |
| 6 | 544.973 | -50.89 | -60.50 | -54.00 | 6.50 | -9.61 | RMS | Vertical |
| 7 | 1134.8 | -62.13 | -63.53 | -30.00 | 33.53 | -1.40 | RMS | Vertical |
| 8 | 2405.2 | -60.33 | -50.25 | -30.00 | 20.25 | 10.08 | RMS | Vertical |
| 9 | 2874.6 | -70.06 | -56.42 | -30.00 | 26.42 | 13.64 | RMS | Vertical |
| 10 | 4810.575 | -59.65 | -61.34 | -30.00 | 31.34 | -1.69 | RMS | Vertical |
| 11 | 6770.325 | -63.82 | -57.91 | -30.00 | 27.91 | 5.91 | RMS | Vertical |
| 12 | 12509.17 | -71.22 | -56.52 | -30.00 | 26.52 | 14.70 | RMS | Vertical |

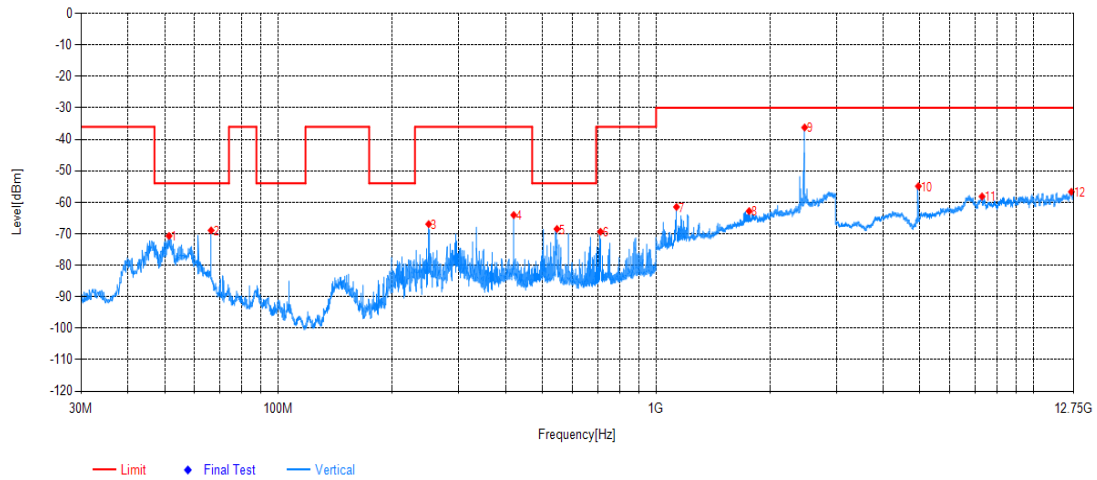
2475MHz
Horizontal



Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| 1 | 52.116 | -59.01 | -76.18 | -54.00 | 22.18 | -17.17 | RMS | Horizontal |
| 2 | 100.422 | -52.19 | -69.05 | -54.00 | 15.05 | -16.86 | RMS | Horizontal |
| 3 | 249.996 | -52.15 | -68.01 | -36.00 | 32.01 | -15.86 | RMS | Horizontal |
| 4 | 419.94 | -55.51 | -66.74 | -36.00 | 30.74 | -11.23 | RMS | Horizontal |
| 5 | 588.041 | -60.24 | -68.32 | -54.00 | 14.32 | -8.08 | RMS | Horizontal |
| 6 | 714.917 | -59.21 | -65.45 | -36.00 | 29.45 | -6.24 | RMS | Horizontal |
| 7 | 1136.2 | -61.47 | -63.36 | -30.00 | 33.36 | -1.89 | RMS | Horizontal |
| 8 | 1714.2 | -67.46 | -61.79 | -30.00 | 31.79 | 5.67 | RMS | Horizontal |
| 9 | 2478.8 | -50.55 | -38.51 | -30.00 | 8.51 | 12.04 | RMS | Horizontal |
| 10 | 4949.025 | -58.12 | -59.07 | -30.00 | 29.07 | -0.95 | RMS | Horizontal |
| 11 | 7302.675 | -64.67 | -58.29 | -30.00 | 28.29 | 6.38 | RMS | Horizontal |
| 12 | 11154.9 | -69.40 | -56.65 | -30.00 | 26.65 | 12.75 | RMS | Horizontal |

Vertical



Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1 | 51.34 | -57.42 | -70.71 | -54.00 | 16.71 | -13.29 | RMS | Vertical |
| 2 | 66.375 | -52.95 | -68.92 | -54.00 | 14.92 | -15.97 | RMS | Vertical |
| 3 | 249.996 | -50.66 | -66.92 | -36.00 | 30.92 | -16.26 | RMS | Vertical |
| 4 | 419.94 | -52.95 | -64.05 | -36.00 | 28.05 | -11.10 | RMS | Vertical |
| 5 | 546.525 | -58.85 | -68.48 | -54.00 | 14.48 | -9.63 | RMS | Vertical |
| 6 | 712.977 | -63.39 | -69.35 | -36.00 | 33.35 | -5.96 | RMS | Vertical |
| 7 | 1133.2 | -60.13 | -61.49 | -30.00 | 31.49 | -1.36 | RMS | Vertical |
| 8 | 1764 | -68.89 | -62.80 | -30.00 | 32.80 | 6.09 | RMS | Vertical |
| 9 | 2473.4 | -48.27 | -36.23 | -30.00 | 6.23 | 12.04 | RMS | Vertical |
| 10 | 4949.025 | -54.07 | -54.88 | -30.00 | 24.88 | -0.81 | RMS | Vertical |
| 11 | 7296.825 | -64.51 | -58.16 | -30.00 | 28.16 | 6.35 | RMS | Vertical |
| 12 | 12583.27 | -70.07 | -56.68 | -30.00 | 26.68 | 13.39 | RMS | Vertical |

10 Adaptivity (non-FHSS)

Result: NA

10.1 Limit

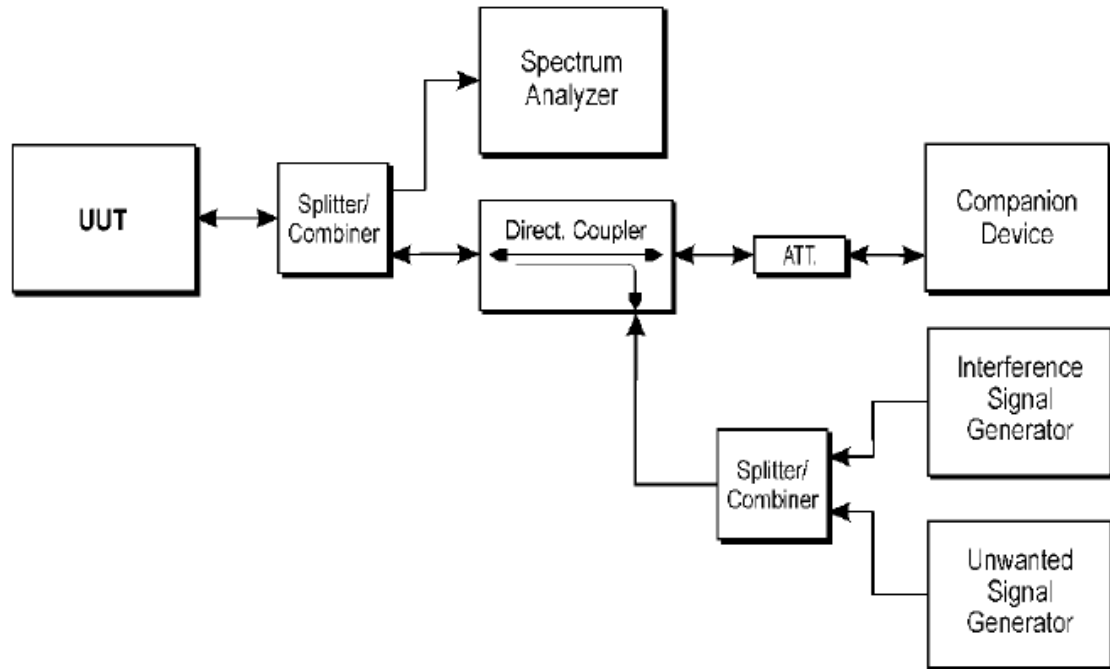
- ☐ For non-FHSS equipment using DAA mechanism, please refer to EN 300 328 clause 4.3.2.6.2;
- ☐ For Frame Based Equipment, please refer to EN 300 328 clause 4.3.2.6.3.2.2;
- ☐ For Load Based Equipment, please refer to EN 300 328 clause 4.3.2.6.3.2.3;
- ☐ For Short Control Signaling Transmissions, please refer to EN 300 328 clause 4.3.2.6.4

| Unwanted signal parameters | | | |
|---|--|---------------------------------|--------------------------------|
| Equipment Type | Wanted signal mean power from companion device (dBm) | Unwanted signal frequency (MHz) | Unwanted CW signal power (dBm) |
| DAA | -30 (see note 2) | 2395 or 2488,5 (see note 1) | -35 (see note 2) |
| NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. | | | |
| NOTE 2: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density in front of the UUT antenna. | | | |

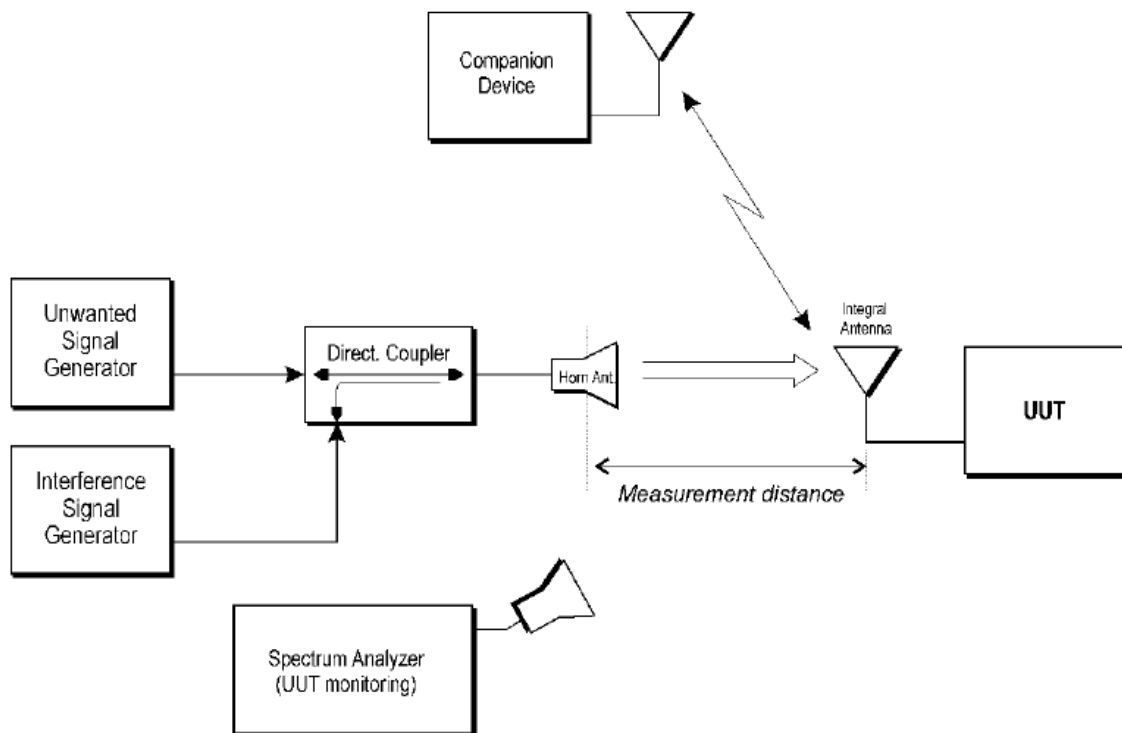
| Unwanted signal parameters | | | |
|---|--|---------------------------------|--------------------------------|
| Equipment Type | Wanted signal mean power from companion device | Unwanted signal frequency (MHz) | Unwanted CW signal power (dBm) |
| LBT | sufficient to maintain the link (see note 2) | 2395 or 2488,5 (see note 1) | -35 (see note 3) |
| NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. | | | |
| NOTE 2: A typical conducted value which can be used in most cases is -50 dBm/MHz. | | | |
| NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density in front of the UUT antenna. | | | |

10.2 Block Diagram of Test Setup

10.2.1 For conducted method



10.2.2 For radiated method



10.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

When supported by the operating frequency range of the equipment, this test shall be performed on two operating (hopping) frequencies randomly selected from the operating frequencies used by the equipment. The first (lower) frequency shall be randomly selected within the range 2 400 MHz to 2 442 MHz while the second (higher) frequency shall be randomly selected within the range 2 442 MHz to 2 483,5 MHz. The equipment shall be in a normal operating (hopping) mode. In case of FHSS equipment, it shall be ensured that none of the test frequencies are blacklisted, otherwise another test frequency shall be selected.

For equipment which can operate in an adaptive and a non-adaptive mode, it shall be verified that prior to the test, the equipment is operating in the adaptive mode.

The equipment shall be configured in a mode that results in the longest Channel Occupancy Time.

☐ For conducted method

The EUT was connected to the spectrum analyzer directly. Please refer to EN 300 328 Clause 5.4.6.2.1 for test method.

☐ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.6.2.2 for test method.

10.4 Test Result

None

11 Receiver Blocking

Result: Pass

11.1 Limit

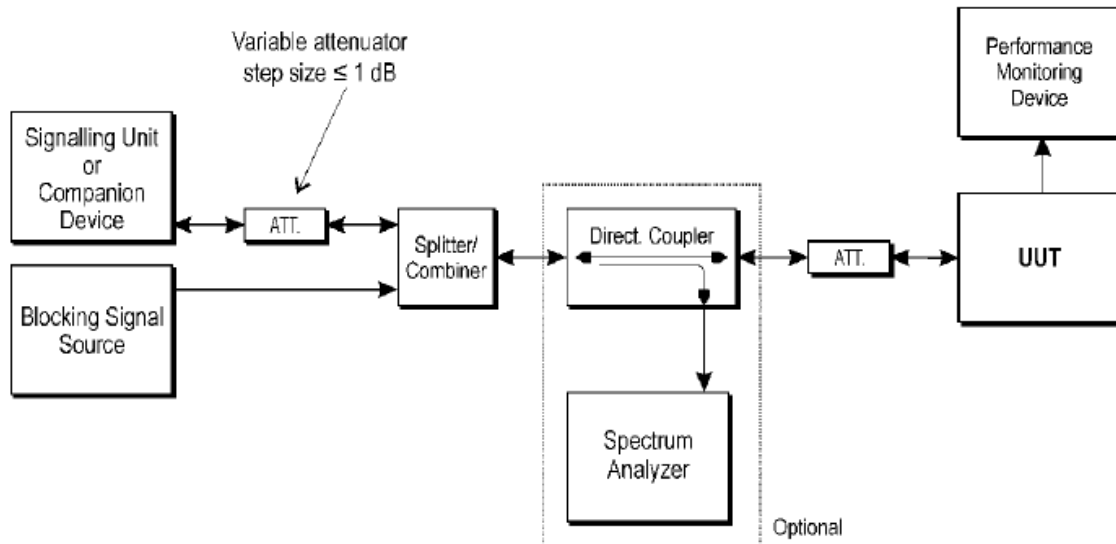
| Receiver Category 1 Equipment | | | |
|--|--|---|-------------------------|
| Wanted signal mean power from companion device (dBm) (see notes 1 and 4) | Blocking Signal Frequency (MHz) | Blocking Signal Power (dBm) (See note 4) | Type of blocking signal |
| (-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2) | 2 380 2 504 | -34 | CW |
| (-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3) | 2 300 2 330 2 360 2 524 2 584 2 674 | | |
| NOTE 1: OCBW is in Hz. | | | |
| NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. | | | |
| NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. | | | |
| NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. | | | |

| Receiver Category 2 Equipment | | | |
|---|----------------------------------|--|-------------------------|
| Wanted signal mean power from companion device (dBm) (see notes 1 and 3) | Blocking Signal Frequency (MHz) | Blocking Signal Power (dBm) (See note 3) | Type of blocking signal |
| $(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ whichever is less (see note 2) | 2 380 2 504 2 300 2 584 | -34 | CW |
| <p>NOTE 1: OCBW is in Hz.</p> <p>NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\text{min}} + 26 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.</p> <p>NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.</p> | | | |

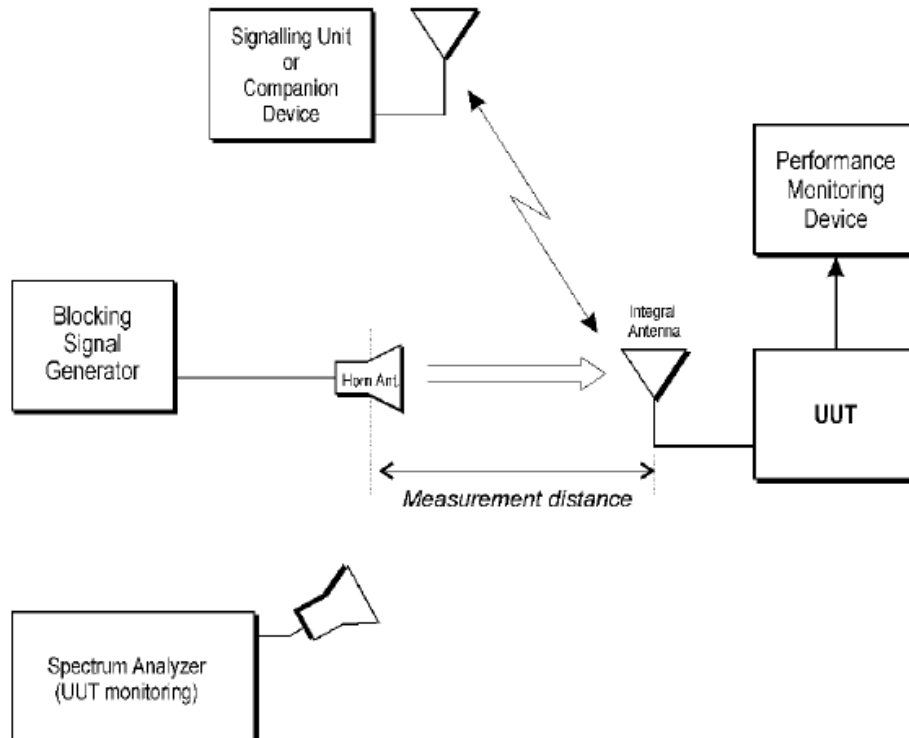
| Receiver Category 3 Equipment | | | |
|---|----------------------------------|--|-------------------------|
| Wanted signal mean power from companion device (dBm) (see notes 1 and 3) | Blocking Signal Frequency (MHz) | Blocking Signal Power (dBm) (See note 3) | Type of blocking signal |
| $(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB})$ or $(-74 \text{ dBm} + 20 \text{ dB})$ whichever is less (see note 2) | 2 380 2 504 2 300 2 584 | -34 | CW |
| <p>NOTE 1: OCBW is in Hz.</p> <p>NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\text{min}} + 30 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.</p> <p>NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.</p> | | | |

11.2 Block Diagram of Test Setup

11.2.1 For conducted method



11.2.2 For radiated method



11.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

For non-FHSS equipment, having more than one operating channel, the operating channels on which the testing has to be performed shall be selected as follows:

- For testing blocking frequencies less than 2 400 MHz, the equipment shall operate on the lowest operating channel.
- For testing blocking frequencies greater than 2 500 MHz, the equipment shall operate on the highest operating channel.

Equipment which can change their operating channel automatically (adaptive channel allocation), and where this function cannot be disabled, shall be tested as a FHSS equipment.

If the equipment can be configured to operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used. This mode of operation shall be aligned with the performance criteria defined in clause 4.3.1.12.3 or clause 4.3.2.11.3 and shall be described in the test report.

☒ For conducted method

The EUT was connected to the spectrum analyzer directly. Please refer to EN 300 328 Clause 5.4.11.2.1 for test method.

☐ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.11.2.2 for test method.

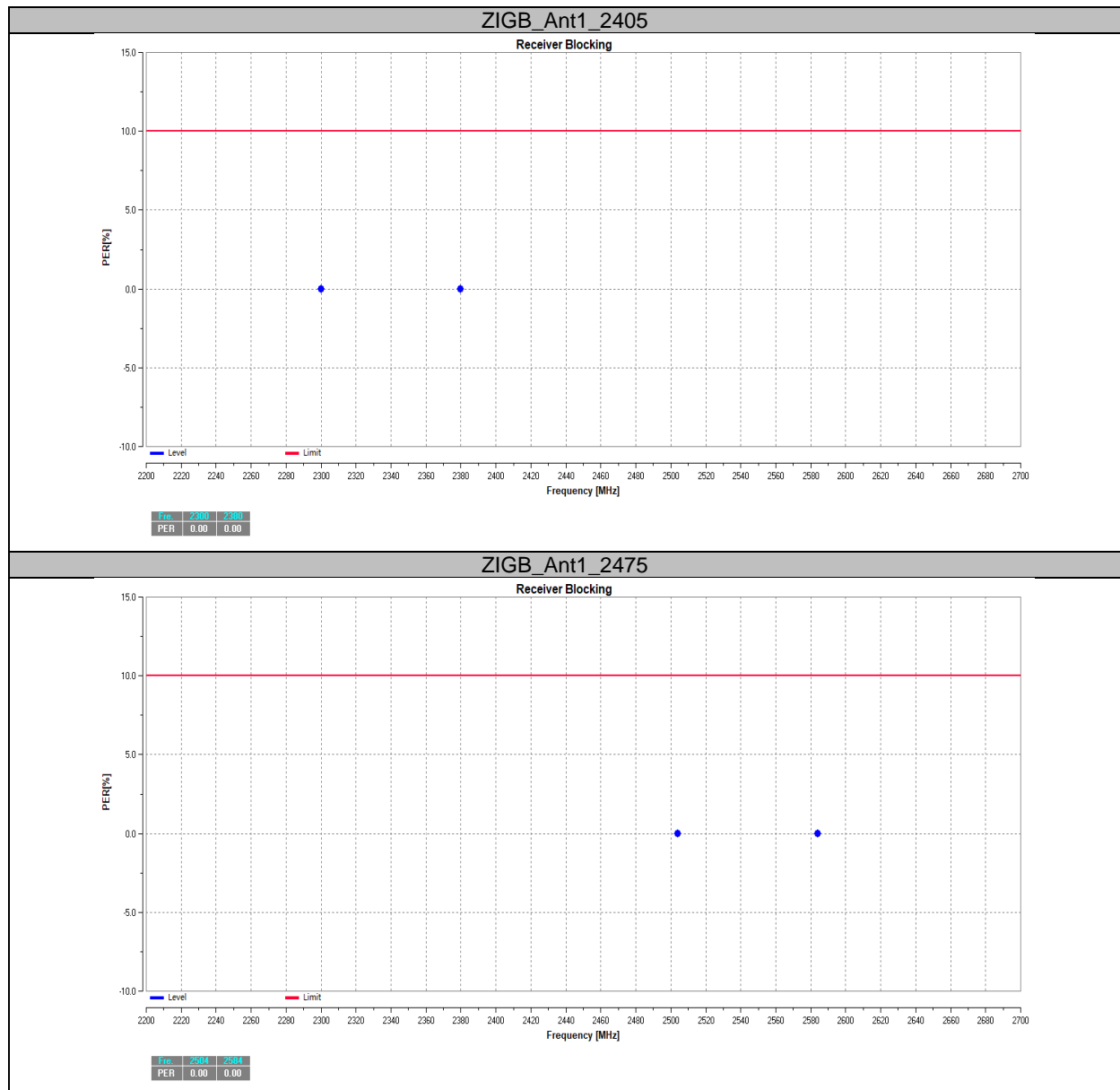
11.4 Test Result

| Mode | Channel | Wanted signal [dBm] | Freq. [MHz] | CW [dBm] | PER [%] | Limit [%] | Pass/Fail |
|--------|---------|---------------------|-------------|----------|---------|-----------|-----------|
| Zigbee | L | -65.04 | 2300 | -33.5 | 0.00 | ≤10 | PASS |
| | | -65.04 | 2380 | -33.5 | 0.00 | ≤10 | PASS |
| | H | -65 | 2504 | -33.5 | 0.00 | ≤10 | PASS |
| | | -65 | 2584 | -33.5 | 0.00 | ≤10 | PASS |

Note 1: OCBW is in Hz.

Note 2: The Performance Criteria is based on the PER less than or equal to 10 %.

Note 3: For the conducted measurements, blocking signal power = the actual blocking signal power+ antenna assembly gain (G).



12 Receiver spurious emission

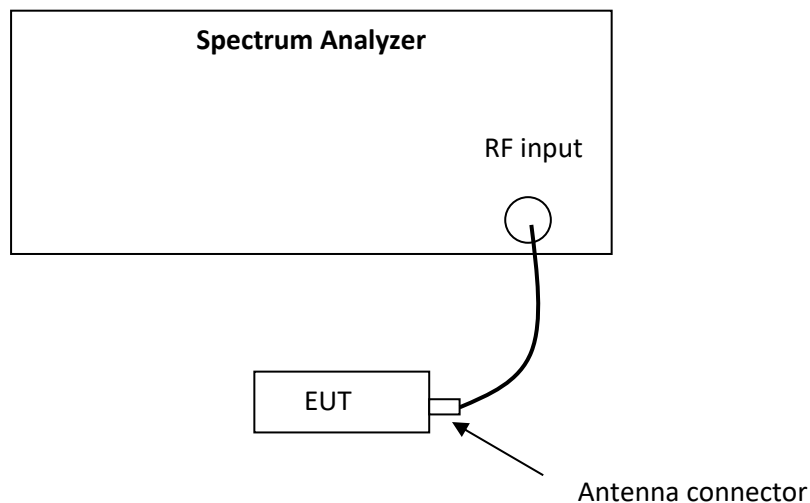
Test result: Pass

12.1 Limit

| Frequency range | Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz) | Bandwidth |
|--------------------|---|-----------|
| 30 MHz to 1 GHz | -57 dBm | 100 kHz |
| 1 GHz to 12,75 GHz | -47 dBm | 1 MHz |

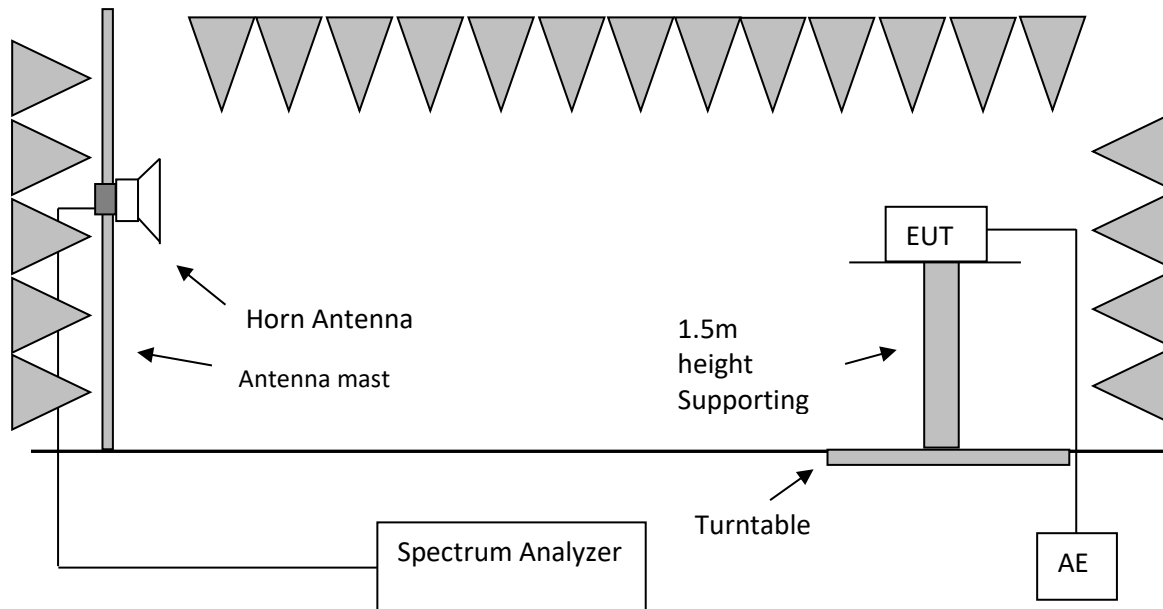
12.2 Block Diagram of Test Setup

12.2.1 For conducted method

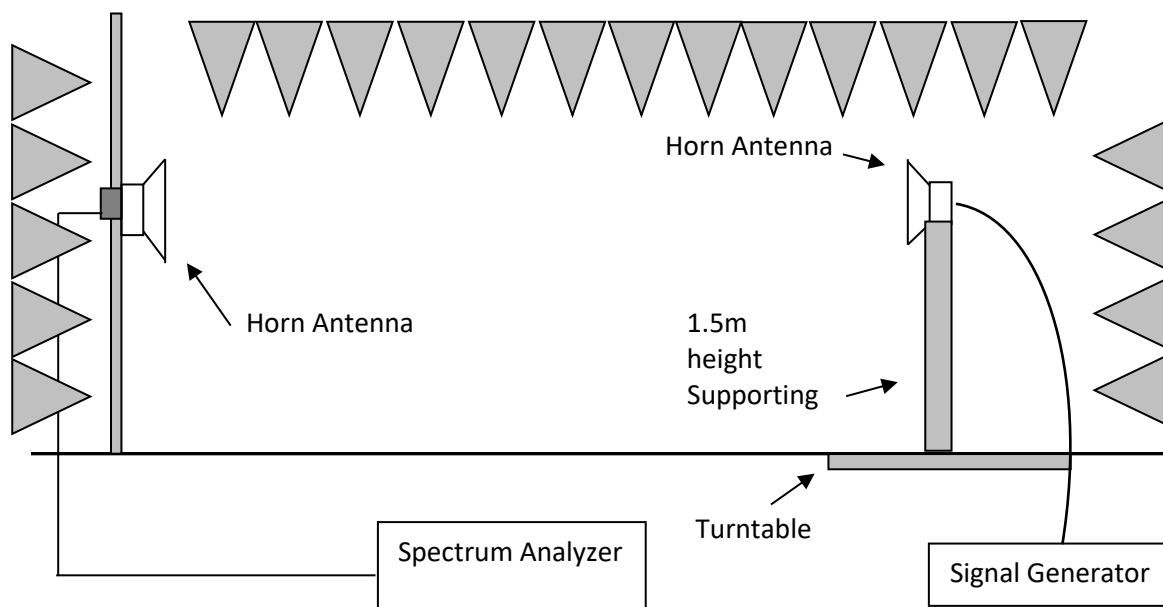


12.2.2 For radiated method

Step one



Step two



Note: for frequency lower than the 1GHz, the horn antennas among the two block diagrams above should be replaced with dipole antennas (or other antennas provided they can be referenced to a dipole).

12.3 Test Conditions and Test Method

These measurements shall only be performed at normal test conditions.

Testing shall be performed when the equipment is in a receive-only mode.

For non-FHSS equipment, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These frequencies shall be recorded.

For FHSS equipment, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. These frequencies shall be recorded. When disabling the normal hopping is not possible, the measurement shall be performed during normal operation (hopping).

☐ For conducted method

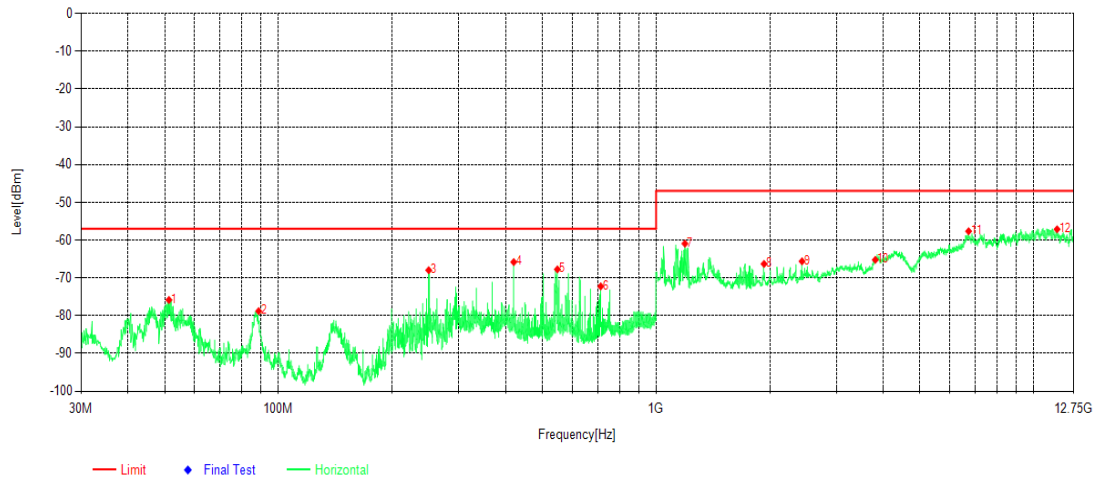
The EUT was connected to the spectrum analyzer directly. Please refer to EN 300 328 Clause 5.4.10.2.1 for test procedure.

☒ For radiated method

The measurement was applied in a semi-anechoic chamber. Please refer to EN 300 328 Clause 5.4.10.2.2 for test procedure.

12.4 Test protocol

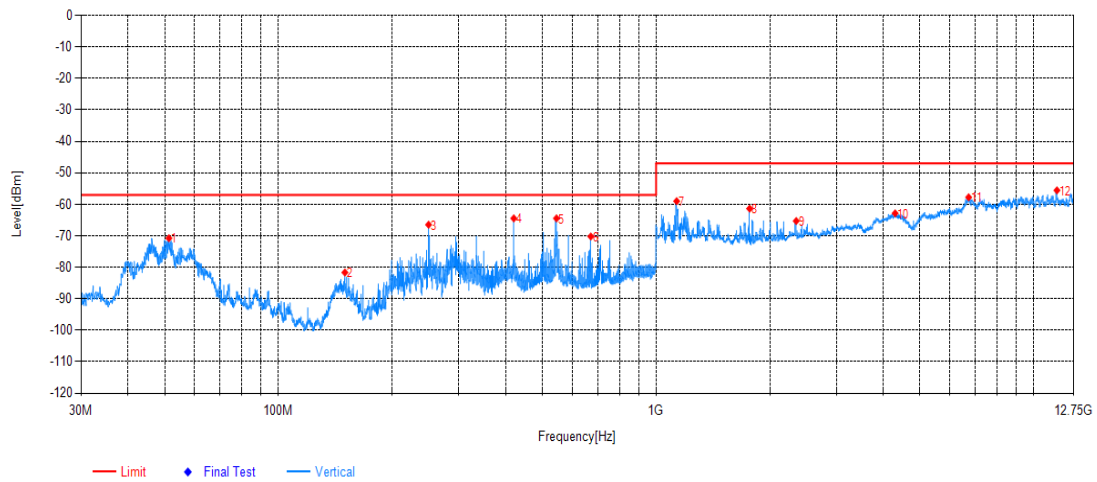
2405MHz
Horizontal



Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| 1 | 51.34 | -58.78 | -75.86 | -57.00 | 18.86 | -17.08 | RMS | Horizontal |
| 2 | 88.685 | -61.04 | -78.81 | -57.00 | 21.81 | -17.77 | RMS | Horizontal |
| 3 | 249.996 | -52.12 | -67.98 | -57.00 | 10.98 | -15.86 | RMS | Horizontal |
| 4 | 419.94 | -54.60 | -65.83 | -57.00 | 8.83 | -11.23 | RMS | Horizontal |
| 5 | 547.98 | -58.29 | -67.77 | -57.00 | 10.77 | -9.48 | RMS | Horizontal |
| 6 | 714.044 | -66.01 | -72.26 | -57.00 | 15.26 | -6.25 | RMS | Horizontal |
| 7 | 1192.7 | -47.25 | -60.93 | -47.00 | 13.93 | -13.68 | RMS | Horizontal |
| 8 | 1931.775 | -54.27 | -66.32 | -47.00 | 19.32 | -12.05 | RMS | Horizontal |
| 9 | 2435.85 | -55.59 | -65.62 | -47.00 | 18.62 | -10.03 | RMS | Horizontal |
| 10 | 3807.075 | -61.11 | -65.24 | -47.00 | 18.24 | -4.13 | RMS | Horizontal |
| 11 | 6722.25 | -63.09 | -57.67 | -47.00 | 10.67 | 5.42 | RMS | Horizontal |
| 12 | 11526.82 | -69.99 | -57.15 | -47.00 | 10.15 | 12.84 | RMS | Horizontal |

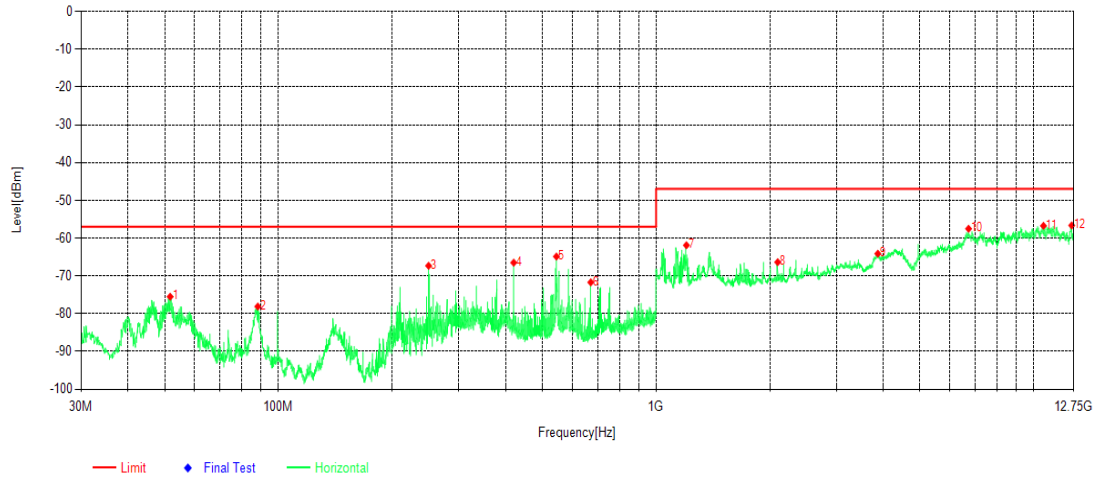
Vertical



Suspected Data List

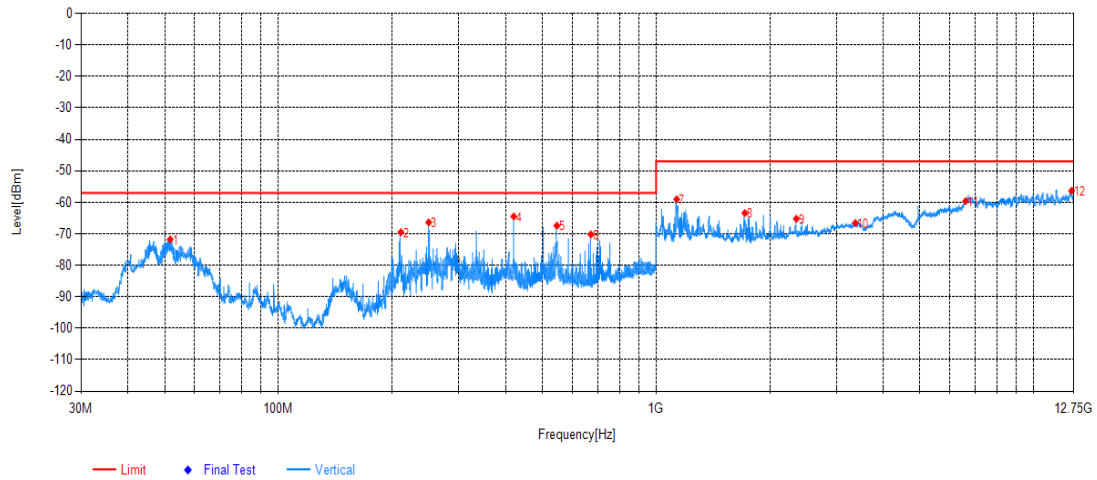
| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1 | 51.34 | -57.49 | -70.78 | -57.00 | 13.78 | -13.29 | RMS | Vertical |
| 2 | 149.989 | -62.93 | -81.68 | -57.00 | 24.68 | -18.75 | RMS | Vertical |
| 3 | 249.996 | -50.23 | -66.49 | -57.00 | 9.49 | -16.26 | RMS | Vertical |
| 4 | 419.94 | -53.37 | -64.47 | -57.00 | 7.47 | -11.10 | RMS | Vertical |
| 5 | 544.973 | -54.87 | -64.48 | -57.00 | 7.48 | -9.61 | RMS | Vertical |
| 6 | 671.946 | -62.60 | -70.22 | -57.00 | 13.22 | -7.62 | RMS | Vertical |
| 7 | 1133.95 | -45.13 | -59.00 | -47.00 | 12.00 | -13.87 | RMS | Vertical |
| 8 | 1768.45 | -47.67 | -61.38 | -47.00 | 14.38 | -13.71 | RMS | Vertical |
| 9 | 2351.25 | -54.75 | -65.30 | -47.00 | 18.30 | -10.55 | RMS | Vertical |
| 10 | 4295.875 | -60.74 | -62.87 | -47.00 | 15.87 | -2.13 | RMS | Vertical |
| 11 | 6724.6 | -63.42 | -57.77 | -47.00 | 10.77 | 5.65 | RMS | Vertical |
| 12 | 11516.25 | -69.39 | -55.58 | -47.00 | 8.58 | 13.81 | RMS | Vertical |

2475MHz
Horizontal



| Suspected Data List | | | | | | | | |
|---------------------|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
| 1 | 51.728 | -58.39 | -75.52 | -57.00 | 18.52 | -17.13 | RMS | Horizontal |
| 2 | 88.2 | -60.04 | -78.12 | -57.00 | 21.12 | -18.08 | RMS | Horizontal |
| 3 | 249.996 | -51.47 | -67.33 | -57.00 | 10.33 | -15.86 | RMS | Horizontal |
| 4 | 420.037 | -55.28 | -66.51 | -57.00 | 9.51 | -11.23 | RMS | Horizontal |
| 5 | 544.973 | -55.33 | -64.88 | -57.00 | 7.88 | -9.55 | RMS | Horizontal |
| 6 | 671.946 | -64.18 | -71.72 | -57.00 | 14.72 | -7.54 | RMS | Horizontal |
| 7 | 1203.275 | -48.37 | -61.90 | -47.00 | 14.90 | -13.53 | RMS | Horizontal |
| 8 | 2099.8 | -54.55 | -66.39 | -47.00 | 19.39 | -11.84 | RMS | Horizontal |
| 9 | 3864.65 | -60.17 | -64.14 | -47.00 | 17.14 | -3.97 | RMS | Horizontal |
| 10 | 6723.425 | -62.94 | -57.53 | -47.00 | 10.53 | 5.41 | RMS | Horizontal |
| 11 | 10609.15 | -68.39 | -56.75 | -47.00 | 9.75 | 11.64 | RMS | Horizontal |
| 12 | 12603.12 | -70.16 | -56.65 | -47.00 | 9.65 | 13.51 | RMS | Horizontal |

Vertical



| Suspected Data List | | | | | | | | |
|---------------------|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
| 1 | 51.728 | -58.54 | -71.79 | -57.00 | 14.79 | -13.25 | RMS | Vertical |
| 2 | 211.002 | -51.96 | -69.51 | -57.00 | 12.51 | -17.55 | RMS | Vertical |
| 3 | 249.996 | -50.12 | -66.38 | -57.00 | 9.38 | -16.26 | RMS | Vertical |
| 4 | 420.037 | -53.39 | -64.49 | -57.00 | 7.49 | -11.10 | RMS | Vertical |
| 5 | 546.04 | -57.80 | -67.42 | -57.00 | 10.42 | -9.62 | RMS | Vertical |
| 6 | 671.946 | -62.58 | -70.20 | -57.00 | 13.20 | -7.62 | RMS | Vertical |
| 7 | 1133.95 | -45.19 | -59.06 | -47.00 | 12.06 | -13.87 | RMS | Vertical |
| 8 | 1717.925 | -50.40 | -63.42 | -47.00 | 16.42 | -13.02 | RMS | Vertical |
| 9 | 2351.25 | -54.70 | -65.25 | -47.00 | 18.25 | -10.55 | RMS | Vertical |
| 10 | 3369.975 | -60.12 | -66.57 | -47.00 | 19.57 | -6.45 | RMS | Vertical |
| 11 | 6601.225 | -63.57 | -59.64 | -47.00 | 12.64 | 3.93 | RMS | Vertical |
| 12 | 12604.3 | -69.63 | -56.33 | -47.00 | 9.33 | 13.30 | RMS | Vertical |

13 Geo-location capability

Test result: NA

13.1 Applicability

This requirement only applies to non-FHSS equipment with geo-location capability.

13.2 Requirements

The geographical location determined by the non-FHSS equipment shall not be accessible to the user in a way that would allow the user to alter it.

13.3 Description

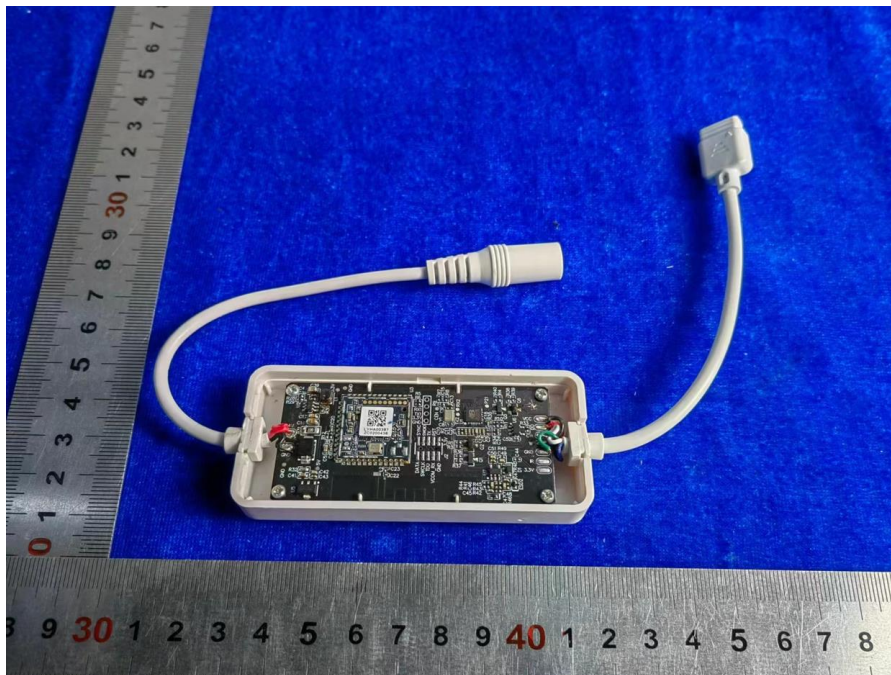
This device doesn't support this capability declared by the manufacturer.

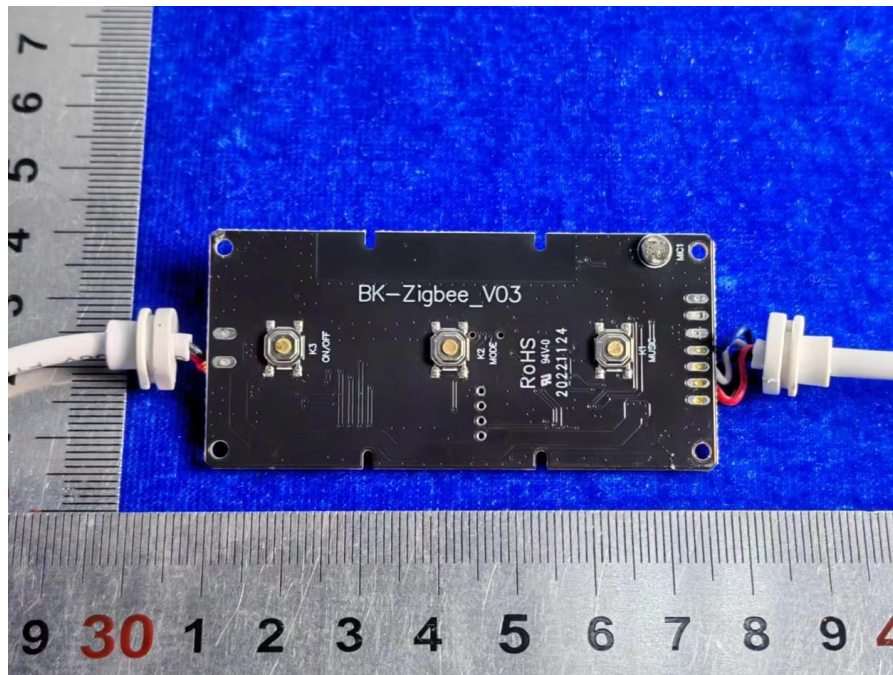
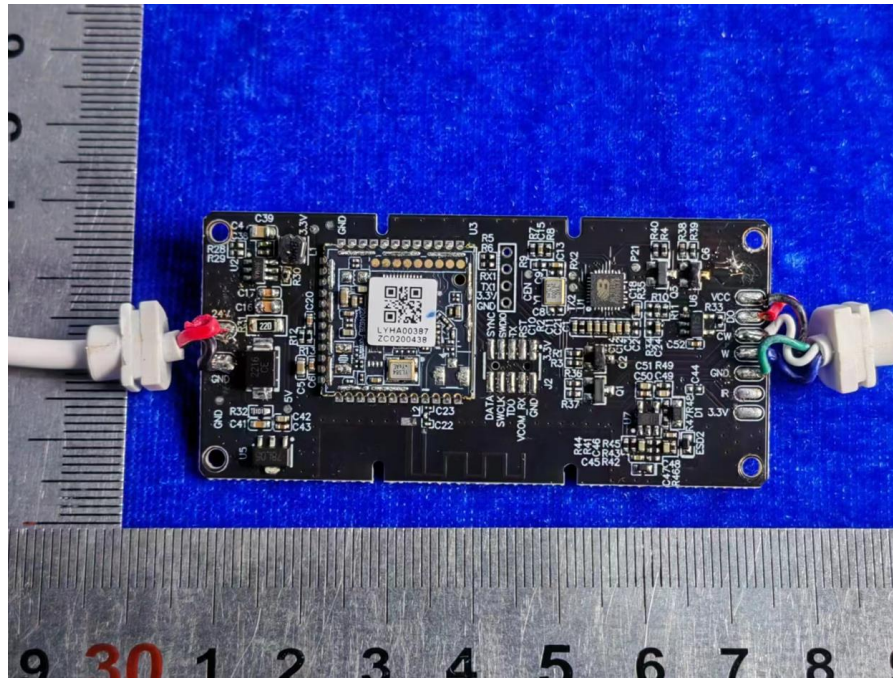
Appendix I: Photograph of equipment under test

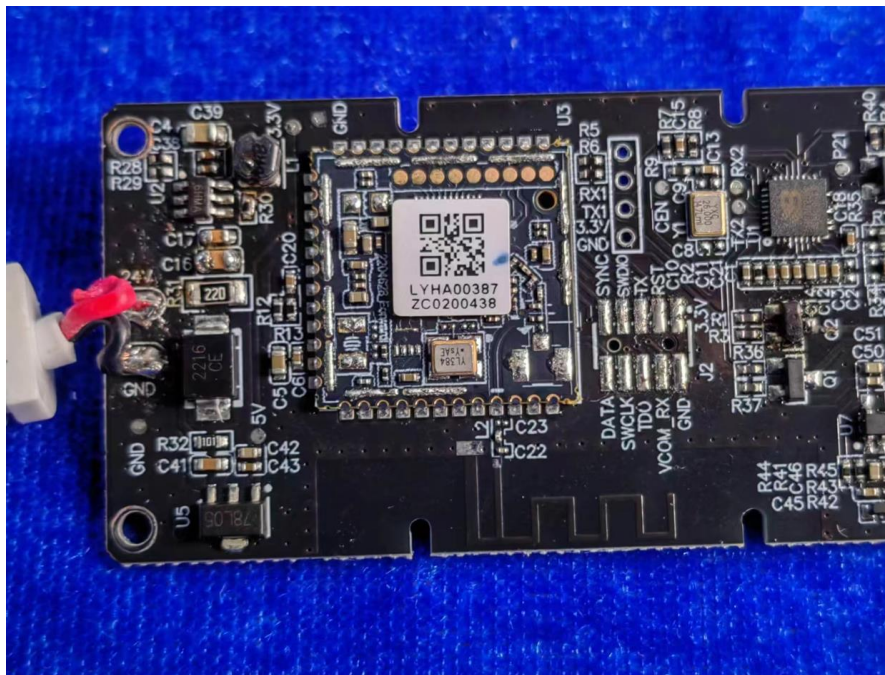
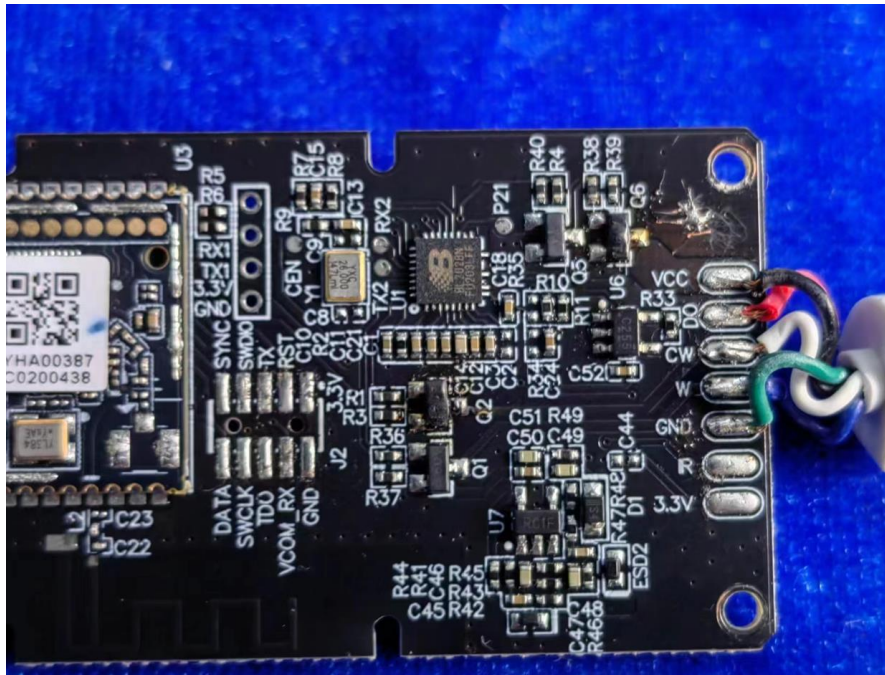












***** END *****